American Gas Association MONTHLY

Natural Gas War Conference

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A Postwar Platform for Gas

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Storing Gas for Peak Loads

•

Importance of Gas Research

•

Rates for Gas Space Heating

June 1944

VOLUME XXVI NUMBER 6

Modern Gas heating is a MACHINE TOOL!

It fits right into the production line and is "tailor-made" for the job

Hand in hand with metallurgical advances has come the science of Gas heat-treating, which today is used in industry as a precision machine tool—part of the inline production process. No longer is it a separate, remote operation.

Modern heat-treating furnaces were born in World War I, grew up in the twenties and thirties and matured in World War II. Three years of production of complex war materials have brought about major changes in equipment for Gas heat-treating which have built this necessary operation right into the production line, have afforded new techniques for heat application to limited surfaces, and have carried the science of heat application to a new high.

That's why every industrial man concerned with heat-treating—should keep up-to-date on the present-day techniques of Gas heat-treating . . . for they will be vital to industry after the war. Ask the industrial Gas engineer of your Gas company for information on these techniques.

AMERICAN GAS ASSOCIATION
INDUSTRIAL AND COMMERCIAL GAS SECTION
420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

THE TREND IS TO GAS
FOR ALL INDUSTRIAL HEATING

American Gas Association national industrial and commercial gas advertisement which appeared in recent issues of The Iron Age, Metals and Alloys, and Steel.

American Gas Association MONTHLY

CONTENTS FOR JUNE 1944

There is not much light summer reading in this issue, but much serious and significant material on weighty problems of the day, which is certainly appropriate in view of the world situation. . . . The natural gas conference, to which a major part of the space is devoted, was a gold mine of information on many problems, pertinent both to the war and postwar periods. Speakers at the general sessions covered such subjects as national socialistic and regulatory trends, natural gas reserves, industrial education, and research. . . . For the operating man, the two symposiums unearthed a vast amount of useful transmission and underground storage experience. While space in the MONTHLY *is inadequate to do more than mention the subjects and speakers, separate printed pamphlets will be published to cover each symposium. Dr. Sayers' report on joint A. G. A.-Bureau of Mines' research is a timely account of monumental tasks completed as well as a forecast of things to come. . . . While the Cleveland liquefaction plant ceases to be a novelty, its 3 years' operating results, capably presented by Charlie Turner, are noteworthy. . . . Highlights of the successful Accounting and Distribution Conferences are other features of this issue.*

SUBSCRIPTION · $3.00 A YEAR

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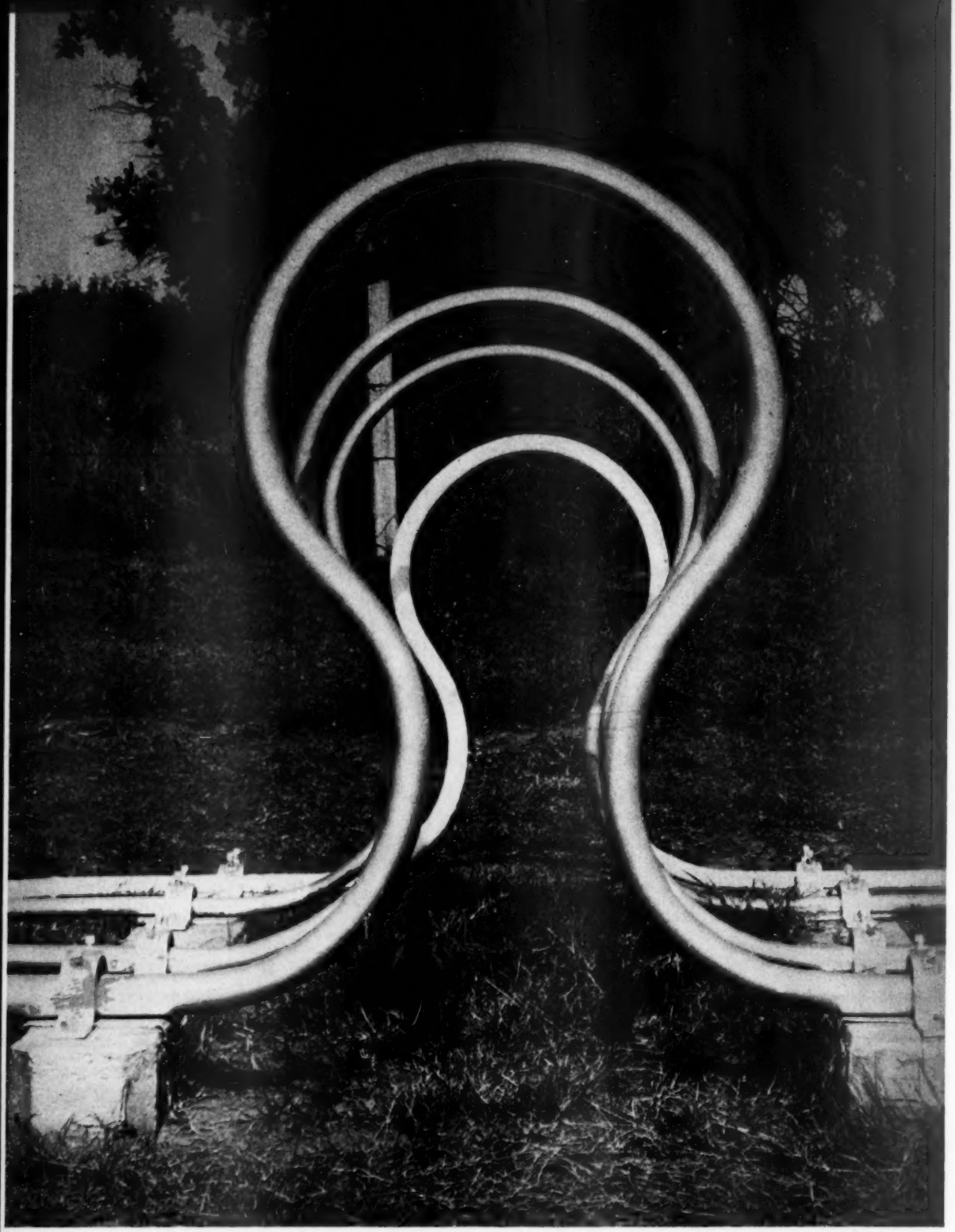

Expansion coils in connection with high pressure well of the Oklahoma Natural Gas Company in Chickasha Field. Photographed in summer when only one coil was in use. Note "icing" on smallest coil. The picture was taken by Ruth Canaday, of Oklahoma Natural Gas Company, who has been the most frequent winner in the A. G. A. MONTHLY frontispiece contest.

American Gas Association MONTHLY

JAMES M. BEALL, *Editor*

NATURAL GAS
. . . Annual Conference Makes Vital Contributions

AS the war approaches its climax, the natural gas industry, holding its annual Spring Conference, focussed attention on problems vital to the success of that effort and the critical period to follow. Assembling at French Lick, Indiana, Thursday, Friday and Saturday, May 11-13, more than 400 leaders of the industry took part in the conference under the sponsorship of the Natural Gas Department of the American Gas Association.

Appropriately, the preponderant emphasis of the conference was on subjects inextricably linked with the war and also vitally important in the peacetime economy of the nation, namely, large volume storage and long distance transmission of gas. With tremendous quantities of natural gas being used in war plants, the problem of furnishing adequate supplies of gas at strategic war areas continues to be of paramount importance. As a consequence, it was fitting that two-thirds of the conference time should be devoted to phases of this problem.

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The nub of the problem was expressed by J. French Robinson, chairman of the Natural Gas Department, and president, The East Ohio Gas Co., Cleveland, when he said:

"It is very much in order at this time, also, that we reckon with the sources and reserves of natural gas, together with their location—*especially* their location. . . . . Briefly, it is an acute condition of regional depletion in a nation of natural gas plenty. But the plenty is also regional—and the regions of plenty are in geographical dislocation with the regions of depletion, often distantly so. These latter are basic industrial districts of the United States. They are necessary to both the pursuit of war and the progress of peace, and are vitally dependent on natural gas. It has been part of their growth and is part of their continued existence."

As chairman of the conference and also as a leading factor in the recent reorganization of the American Gas Association, Mr. Robinson's remarks were a highlight of the meeting. Speaking on "Natural Gas, the Natural Gas Industry and Wars," he underscored the fact that "we have a successful industry well organized for *any* effort," but expressed concern over "the continuing breakdown of constitutional self-government in America."

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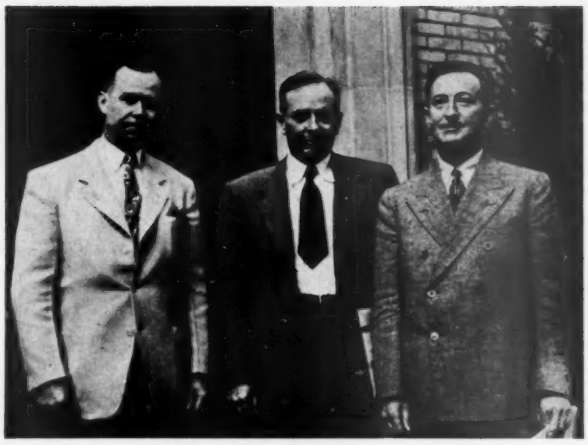
In regard to the industry's war organization, Mr. Robinson said: "We have gained, through war, experience and knowledge in organizing the entire natural gas and petroleum industry into a smoothly working, efficient, and highly responsive mechanism. The temporary coordination of oil and gas was the voluntary and, therefore, effective response to an emergency. It was logical and necessary against that background. Its lessons will never be unlearned, nor will the volunteering willingness which energized it ever be lost."

Turning to governmental relations, he declared that "we delegated authority but did not surrender control. That principle is the heart of the American system. Believe me, we are not taking our finger off its pulse! Industrial integration and coordination will function as long as they are voluntary—but no longer." He concluded that "It is not our liberty and our American institutions that are on trial, for they have been justified. It is the Americans' capacity for retaining them that is on trial."

Major Alexander Forward, managing director of the Association, who was the opening speaker, praised Chairman Robinson's efforts in bringing about a realignment of Association activities in order to render greater industry service. These organizational changes, he said, "which have taken place in the Association will greatly strengthen the means taken to produce and advance the interests of the natural gas industry." He warned, however, that their full fruition will depend upon receiving the necessary support from all sections of the industry. "No national organization any-

Chairman J. French Robinson, A. G. A. vice-president, and president, The East Ohio Gas Company, discussing the agenda with Honoria B. Moomaw, Natural Gas Department secretary



A California trio: Marion L. Fort; Arthur F. Bridge, A. G. A. past president; and William Moeller, Jr., past chairman, Natural Gas Department—all of Los Angeles

where can successfully operate without it. For the power that motivates the machinery must come from leadership and constructive thought and purpose while the machines themselves are operated by trained personnel in the Association."

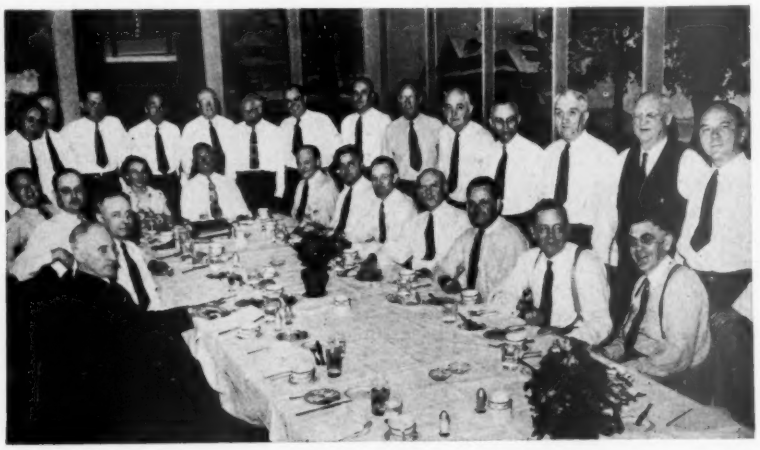
The Association's president, Ernest R. Acker, president, Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y., also hailed the new organization of natural gas and manufactured gas departments as a milestone in the Association's progress. He emphasized that the change was in no sense a division of the industry but simply a working arrangement to allow concentration on the most important problems. A united front is more necessary now than ever before, he asserted.

President Acker also outlined the A. G. A.'s postwar program, including its research activities, and referred to the strengthening of the work of The Institute of Gas Technology. In conclusion, he strongly urged the gas industry to adopt an enlarged coordinated promotional campaign to capitalize on the preparatory work now under way in the form of research and postwar planning. A campaign to attain these objectives is now in the hands of an A. G. A. committee and will shortly be placed before the gas industry.

Speaking on "The Freedom of Natural Gas in Interstate Commerce," R. E. Wertz, president, Amarillo Gas Co., Amarillo, Texas, and immediate past chairman, Natural Gas Department, A. G. A., declared that a new challenge faces the industry. After passing through periods where free movement of natural gas in interstate commerce has been the accepted rule, we now face a different set of circumstances, he indicated.

"There are definite straws in the wind," Mr. Wertz said, "which indicate that 'the good old days' are drawing to a close and that the natural gas industry is about to enter the third period of its history, when, so far as natural gas is concerned, the freedom of interstate commerce may not be so free. These straws present a definite threat against the old freedom of putting product and market together by the construction of interstate pipe lines. Our big strong boy of former years

R. E. Wertz, Amarillo, past chairman, Natural Gas Department, on the rostrum



Dinner meeting of the Natural Gas Department's Managing, Advisory and Executive Committees held during the Conference

R. H. Hargrove, Shreveport; Floyd C. Brown, Chicago; and Robert W. Hendee, Colorado Springs. Mr. Hendee, a past chairman of the Natural Gas Department, presided at the transmission symposium

I. K. Peck, Binghamton, N. Y.; Walter C. Beckjord, New York, A. G. A. past president; A. H. Stack, Tampa; and C. E. Bennett, Pittsburgh. Mr. Beckjord heads a Postwar Planning Subcommittee

Chester L. May and D. A. Hulcy, of Dallas, vice-president and president respectively of Lone Star Gas Company; B. C. Adams, Jr., Petroleum Administration for War, Washington; Dr. Frank H. Dotterweich, Texas College of Arts and Industries; and Frank S. Kelly, Jr., Shreveport, president, Southern Gas Association

may have to cease his roaming over the continent, and he may even be compelled to remain at home."

After citing a number of court and commission decisions to support his views, Mr. Wertz continued:

"We must anticipate that there will be increased opposition to the exportation of gas by the major producing states. While a statute prohibiting exportation may not be constitutional, other methods of accomplishing the same end may be attempted, such as taxation or collaboration with the Federal Power Commission to prevent the issuance of a certificate of public convenience and necessity. We must also anticipate that attempts will be made to

A distinguished Conference gathering—left to right: C. A. Lunn, New York; Gerald Neuner, Kansas City; F. W. Sullivan, Jr., New York; A. J. Gonnoud, Brooklyn; Frank C. Smith, Houston; N. T. Sellman, New York; J. H. Moore, New York; Harry K. Wrench, Minneapolis; H. N. Mallon, Bradford

C. H. Waring, Kansas City; C. R. Zeskie, Pittsburgh; and Alfred Hurlburt, Dallas

Kenneth Eilerts, Bartlesville, U. S. Bureau of Mines; and H. D. Hancock, New York, past chairman, Natural Gas Department

Father-and-son, all-gas combination: F. W. Batten, Binghamton Gas Works Co., and J. W. Batten, president, Michigan Consolidated Gas Co.

prevent the utilization of gas for what are considered to be uneconomic uses."

While assuming that most of these issues will be weighed and resolved in the scales of public interest, Mr. Wertz asserted that "it would be gross negligence on the part of the natural gas industry if it did not take a prominent part in assembling the necessary facts to be weighed." Full cooperation with public authorities and closer contact with the Interstate Oil Compact Commission were recommended.

In the absence of Dr. R. R. Sayers, director, United States Bureau of Mines, Washington, Kenneth Eilerts, also of the Bureau, read Dr. Sayers paper on "Natural Gas Research: Its Importance and Possibilities." This timely contribution, covering joint Bureau-A. G. A. research, is published in full elsewhere in this issue.

Dr. Charles E. Iawall, president, West Virginia University, closed the Thursday morning general session with a stimulating address on "Education and Industry" in which he expressed the opinion that risks involved in business management are growing greater. He said this is the time for long-term planning and declared that progressive managements were giving much thought to utilization of industrial training courses in the nation's universities. He outlined such courses now in progress at West Virginia University and mentioned some of the more noteworthy results.

Opening the afternoon general session, C. W. Cooper, vice-president, Consolidated Natural Gas Co., New York, N. Y., collaborating with Howard Waddle, engineer, McKamie Gas Cleaning Co., Magnolia, Ark., described a highly interesting development—that of an installation in which hydrogen sulphide removed from sour natural gas is converted into free sulphur. By this means, a dangerous poison gas is neutralized and rendered harmless to both life and vegetation. In addition, there emerge large and commercial quantities of a new and useful by-product.

Mr. Cooper reported that this new development has been made in the extremely sour McKamie Gas Field in southwestern Arkansas which was discovered in June, 1940. The gas from these wells has an average hydrogen

J. A. Messenger, New York; E. P. Noppel, New York; and Col. Willard F. Rockwell, Pittsburgh, retiring president, Association of Gas Appliance and Equipment Manufacturers

Frank D. Howell, Dominion Natural Gas Co., Ltd., Brantford, Ont., president, Canadian Gas Association, and A. B. Ritzenthaler, Cappan Stove Company, Rochester

sulphide content of about 4,300 grains per 100 cubic feet and, in its natural state, is completely unmarketable.

The new treating installation only went into full operation on March 8, 1944 and is still going through its growing pains, but it is giving out a stream of molten sulphur amounting to 60 tons a day—"golden molasses" the operators call it. In addition, the plant is sending out large quantities of dry, sweet, fuel gas, plus butane, propane and gasoline.

A significant report on natural gas cycling, prepared by Dr. Frank H. Dotterweich, Texas College of Arts and Industries, and Robert Ducker, assistant director, PAW Natural Gas and Natural Gasoline Division, was presented by Dr. Dotterweich. In the brief space of six years, the authors state, 35 cycling plants have been placed in full operation and more are under construction. Present operations process about 2500 million cubic feet daily of gas and recover some 70,000 barrels daily of liquid products. During the month of February, 1944, Dr. Dotterweich said, cycling operations yielded 27 per cent of the nation's total production of natural gasoline and allied liquid products.

Produce 100-Octane Fuel

These plants are playing an important role in the production of 100-octane aviation fuel which, according to figures just released from secrecy regulations, is now pouring into stock tanks at the rate of 400,000 barrels per day, more than 10 times the pre-Pearl Harbor rate of production. As a result of the combined efforts of the industry, the production of natural gasoline and related fractions has been increased from a prewar daily average of 140,000 barrels to 259,000 barrels per day during February of this year.

Dr. Dotterweich also pointed out that, since many of these fields can deliver controlled quantities of gas during cycling operations without detriment to the ultimate recovery of liquefiables, they offer a splendid source of high pressure gas for winter peaks without the compulsion to continue taking substantial quantities throughout the year in order to satisfy the requirements of royalty and working interests. The authors conclude: "Cer-

Left to right: Major T. J. Strickler, Kansas City; Mrs. R. G. Griswold, New York; George E. Whitwell, Philadelphia; Herman Russell, Rochester; Mrs. T. J. Strickler, Kansas City; R. G. Griswold, New York; and Mrs. Herman Russell, Rochester. Messrs. Strickler and Russell are A. G. A. past presidents; Mr. Whitwell is chairman, Laboratories' Managing Committee

Cities Service preferred! Left to right: Major T. J. Strickler, vice-president, Kansas City Gas Co.; H. L. O'Brien, vice-president, Cities Service Co., New York; S. B. Irelan, president, Cities Service Gas Co.; J. L. Stone, president, Danbury Gas & Electric Co.; and George H. Shaw, Petroleum Advisers, New York

H. Carl Wolf, Atlanta, chairman, A. G. A. National Advertising Committee, holds up a bottle of "national advertising vitamin pills," a proper dose of which, he says, will revitalize the gas industry. His smiling audience includes, left to right: H. N. Mallon, Bradford; A. G. A. President Ernest R. Acker, Poughkeepsie; R. J. Rutherford, Worcester; F. M. Banks, Los Angeles; Paul B. McKee, Portland; R. G. Barnett, Portland; E. P. Noppel, New York

K. V. Ludlow, Cleveland, and Charles F. Turner, Cleveland

Frank H. Adams, Toledo, Ohio, and Allan W. Lundstrum

tainly no other single development in the history of oil and gas production has promised any greater contribution to true conservation of our resources of natural gas and allied liquefiables."

A valuable description of data obtained in Bureau of Mines' flow tests on gas-condensate wells, by Kenneth Eilerts, physical chemist, Petroleum and Natural Gas Division, U. S. Bureau of Mines, Bartlesville, Okla., was the final program feature of the general sessions. With the aids of slides, Mr. Eilerts presented important results of tests made with the portable equipment described in an article in April issue of the A. G. A. MONTHLY.

Indicating the working character of the conference, an evening session was held on Friday, following a full day's program. Featured speaker at this session was Captain E. M. Borger, of the American Field Service, who had just returned to his peacetime job as president of The Peoples Natural Gas Co., Pittsburgh, after spending a year at the front in Africa and Italy. Capt. Borger described the operation of the American Field Service and gave a thrilling account of his personal experiences on the battle line.

Optimistic View of Reserves

An optimistic report on probable future discoveries of natural gas reserves was presented at this session by Lyon F. Terry, second vice-president, Chase National Bank, New York.

"Any long-range view of the natural gas industry," Mr. Terry said, "must be based upon a consideration of our total potential supply of natural gas, including both the known reserves and those to be found by future discovery."

"The known reserves of natural gas in the United States are currently estimated by the Petroleum Administration for War to aggregate 110 trillion cubic feet," he continued. "Total production of natural gas reached a record high in 1943 of approximately 4 trillion cubic feet, of which some 3.3 trillion were marketed. Thus our known reserves are equivalent to 27.5 times annual withdrawals on a wartime basis or about 33 times annual requirements for the prewar period.

"For a number of years new gas reserves have been discovered and developed in quantities considerably greater than withdrawals from the fields, which has resulted in the building up of a substantial backlog of available reserves.

"The most important part of our natural gas resources is those undiscovered reserves that undoubtedly will be revealed by future exploration for both oil and gas. Future discoveries of natural gas, of course, cannot be estimated. Predictions that have been made at various times in the past as to the future production of oil and of gas in the United States have in all cases proved to have been much too low."

"In general," Mr. Terry said in conclusion, "the discovery of gas has run parallel to that of oil. . . . . Considering also, in the case of gas, the effects of the compressibility of gas under reservoir pressures found at increasing depths, the significance of the variation in the character of oil to be revealed by deeper drilling, and the recent trend toward the discovery of an increasing proportion of gas fields compared to oil fields, there appears to be all the more reason to conclude that natural gas reserves to be discovered in the future will at least equal, and may exceed, the 200 trillion cubic feet discovered to date."

Davis M. Debard, deputy director, Conservation Division, War Production Board, Washington, D. C., spoke briefly at this session, outlining the gravity of the impending shortage of coal needed to meet the coming winter demand.

Symposiums Valuable

A wealth of valuable information was forthcoming at the two symposiums which made up the entire daytime programs Friday and Saturday. Competent experts from many parts of this country and Canada made reports on storage and long distance transmission in their areas. Lack of space prevents a discussion of these reports here, and it is possible only to list the authors; however, all of the material will be published shortly by the Association.

With the exception of a paper by Charles F. Turner, chief chemist, The East Ohio Gas Co., describing the operating results of the only natural gas liquefaction plant in existence, published in this issue, the first symposium was devoted exclusively to underground storage of natural gas. Under

(Continued on page 279)

Postwar Platform . . . *A.G.A. Committee Makes Recommendations to the Gas Industry*

- **The Postwar Planning Committee of the American Gas Association, A. M. Beebee, Chairman, has just issued a printed report containing 31 conclusions and recommendations designed to unify gas industry thinking and direct its postwar efforts into the most productive channels.**
- **Herewith the Monthly publishes the committee's recommendations which, in effect, form the initial planks in the gas industry's postwar platform. The reasons supporting these recommendations, which are as significant and important as the recommendations themselves, are published at length in the report. All gas companies are strongly urged to obtain copies of the complete report from the Association and to study and support the recommendations.**
- **To implement the objectives of the proposed program, a "Committee of Action," composed of 20 leading gas utility executives in various sections of the country, has been appointed. An Inter-Industry Committee also has been formed to consider problems in connection with trade relation sales practices in the postwar period.**

In order for our industry to be prepared to meet the conditions that will be facing it in the postwar period, it is most important that:

1. *Each unit of the gas industry should not only study but be prepared to support the recommendations of the American Gas Association Postwar Committee.*
2. *Each utility should study and be prepared to assume its share of local responsibility in the postwar employment situation.*
3. *Each utility should support the national advertising program of the American Gas Association and lay plans to still further broaden its effectiveness.*
4. *Each utility should engage competent publicity direction, so as to encourage and shape public opinion in their own area to accept gas as the modern fuel in the home.*
5. *Advertising must concentrate on the use of gas in the kitchen.*
6. *Our industry should fully understand and appreciate the reasons why a modern gas range as a cooking appliance provides a service to the customer that is unexcelled.*
7. *Modern homes of the future will require elimination of cooking odors irrespective of the fuel used. We should encourage this trend, since we have an opportunity to do it in a way that will broaden our market.*
8. *Support should be given to the recently announced coordinated gas kitchen equipment program.*
9. *The use of electricity in the modern kitchen should be encouraged for those uses for which it is particularly suited—such as lighting and power.*
10. *The use of gas in the domestic water heating and refrigeration markets should be aggressively pursued with renewed zeal.*
11. *Each utility should study the potentialities in the house heating and "Year-Around Air Conditioning" fields by first-hand practical experience.*
12. *Each utility should realize the importance to the industry of preserving and aggressively developing the commercial and industrial loads.*
13. *Utilities should study their rate structures to be sure that rates are properly designed to secure loads that can be economically served.*
14. *Basic programs of research should be adopted and research programs should be coordinated.*
15. *We should support both the American Gas Association Laboratories and the Institute of Gas Technology.*
16. *The manufacturers of gas appliances should keep in constant touch with the interesting developments of the research activity of the A. G. A. Laboratory, to the end that gas appliances reflecting these research results be made available at the earliest moments.*
17. *Sales, appliance development, and promotional activities of the industry should be coordinated both by the utilities and manufacturers.*
18. *Needless special appliance requirements of individual companies should be eliminated in order to reduce manufacturing expense.*
19. *Unnecessary multiplicity of models should be avoided so as to lower manufacturing costs of appliances.*
20. *Encouragement should be given manufacturers to advertise and carry on research.*
21. *Each operating gas utility should assume leadership in merchandising in its area, whether it merchandises directly or through dealers or a combination of both.*
22. *An adequate sales force, properly selected, and properly trained will be needed to fully realize on the potential market for gas.*
23. *Service programs of utilities should consider and support dealer activity.*
24. *Utilities should consider giving "back log" orders to manufacturers to help them to prepare for the conversion period.*

25. *Utilities should contact their manufacturers to encourage their cooperation in the American Gas Association postwar recommendations.*
26. *Our industry and the public should be informed of the fact that the combinction service of gas and electricity in the home of tomorrow has a definite interest to the consumer and our national economy.*
27. *The coal and manufactured gas industry should realize and develop their community of interest.*
28. *Our industry should consider cooperation with the liquefied petroleum gas industry, particularly in serving "fringe territory."*
29. *We should support all sound home insulation programs.*
30. *Regional associations and American Gas Association committees and sections should plan their activities in support of postwar recommendations.*
31. *Each company should realize that it can be helpful in support of this program.*

New Postwar Report Covers Economics of Sales of Manufactured Gas

Hall M. Henry

THE first report of the American Gas Association Postwar Planning Subcommittee on Engineering and Economic Phases of the Gas Industry, which has just been released, covers a study of the economics of sales of manufactured gas. The report proper was prepared by the 1943 Market and Economic Research Committee, Hall M. Henry, chairman. A similar study is now under way covering economics of sales of natural gas.

The report throws some light on a number of important factors bearing on the economics of selling. In all there are six major elements on which data have been obtained and mention is made of a seventh covered in a previous report under the title "Market Studies." These are:

1. Evaluating New Business Efforts
2. Revenue Life of Appliances
3. Salesman Power
4. Minimum New Business Expense To Hold Revenues
5. Effects of Home Service on Revenues
6. Study of Aggressive vs. Passive New Business Efforts

Market Studies (Covered by separate report Market and Economic Research Committee—1942)

The first section shows the amount of M.C.F. sales and revenues being obtained by certain companies through the sale of individual appliances and provides a chart from which these companies (and similarly situated companies) can determine how many appliance units of a given type would have to be sold to bring about a desired increase in M.C.F. sales or revenues per customer per year. Data is also given showing that the effectiveness of the New Business effort for a given year cannot be gauged by the gain in M.C.F. sales or revenues as shown in the operating report for that year but that some other method should be employed and a suggested method is given.

The second section gives several case studies of the number of years that different appliances were found to produce revenues. It points out it is important to know for *how many years* a certain appliance will produce revenues as this fact plus the amount of revenue produced yearly will help determine how much a company can afford to spend on New Business to sell a particular appliance. For the companies studied it was found that each of the major appliances (automatic water heaters, refrigerators, house heating) would produce revenue for a minimum of ten years.

Salesman Power

The third section of the report deals with Salesman Power. It points out the relation of Salesman Power to Sales Results under a number of conditions. Some of the factors are:

The effect of the number of customers assigned a salesman on results—the number of appliances sold per salesman year—The amount of revenue added per salesman year—The New Business costs per dollar of revenue added—The compensation being paid salesmen—and many other relationships of interest and value.

Another factor of interest that is covered in the fourth section is the minimum New Business expense necessary to hold revenues. This section clearly shows that in every gas company there is a certain *base cost* of carrying on so-called New Business operations, which should be deducted from the total New Business expense in order to determine the amount being spent to acquire new revenues.

The study on the effects of Home Service is covered in the fifth section. Here is presented a number of case studies showing the gains or losses in revenues from customers contacted by a Home Service girl vs. those not contacted. This section is interesting because (for the companies studied) it indicates that Home Service contacts increased revenues and, in addition to their intangible value, may well occupy a place alongside of appliance selling as a means for increasing revenues.

The sixth and last section of the report covers a study of the effects of Aggressive New Business (as measured by the dollars spent per customer per year on New Business) vs. Passive New Business Efforts. The data presented cover a period of six years and show the relation of the amount spent per year per customer on New Business vs. the gains made in M.C.F. sales, gross revenues and net operating revenues.

The committee believes the gas companies will find this report on the Economics of Sales of Manufactured Gas of sufficient value to justify a thorough study and analysis of their own situations and a comparison with the data given. Certainly one of our major problems is that of selling gas and a study of the economics of selling in our own situations, together with a discussion of this problem, should prove helpful in developing more effective and efficient sales practices. We commend this report to you for careful consideration.

Munroe Award

DO you know of someone whose accomplishments in behalf of the gas industry make him worthy of consideration for the Charles A. Munroe Award?

Consisting of a substantial sum of money and a permanent certificate, this award confers an honorary distinction which is far in excess of any monetary value, and is of especial significance at this time when the gas industry means so much to the war effort.

Since 1929, the Executive Board has made this award annually to individuals judged to have contributed most to the advancement of the gas industry. Such contributions cover every conceivable part of the business and therefore give every individual, no matter in what capacity he may work, an opportunity to participate in the award.

Applications may be sent to Association Headquarters but they must, under the rules, be received by August 1, 1944.

Liquefying and Storing Natural Gas for Peak Loads

By CHARLES F. TURNER

Chief Chemist, The East Ohio Gas Co., Cleveland, Ohio

Charles F. Turner

THE evolution of large diameter long distance pipeline construction over the past decade and a half has made it possible to transport large volumes of natural gas from large producing areas to large industrial centers. Growing house heating loads with their high seasonal demands plus the unprecedented industrial loads brought about by the war have made it imperative for many companies to provide some form of storage system in which can be laid away during periods of low demand the supplies which will be so badly needed in the winter season.

Only Plant of Its Kind

The question arises as to which of the several methods, or combination of methods, may be most satisfactory in a given situation. To reach an intelligent decision involves careful consideration of many factors and the gathering of the best information available on each. Since The East Ohio Gas Company owns, so far as we know, the only plant in existence for liquefying, storing and regasifying natural gas and has operated it for the past three years, our experiences might be of interest, especially to those who are faced with the necessity for storing gas in considerable quantities.

Most of you have read about and some of you have visited the liquefaction plant which is located in Cleveland within a stone's throw of Lake Erie. It has been quite exhaustively described in the trade journals since its completion so, rather than bore you with a repetition of what you may already have read or seen, we shall confine our discussion to a description of its general performance, what it has accomplished for us and some of the things to be weighed by anyone who may be thinking about fitting this kind of storage system into a general plan for meeting peak loads.

Handles Large Volume

From the standpoint of volume, the liquefaction process ranks next to underground storage in the amount of gas which can be laid away. In these days of large demands this fact alone entitles it to serious consideration but the process has other attributes which make it attractive for certain situations. What these are can best be shown by comparing it for the moment with underground storage. In so doing we wish to emphasize the point that in our opinion the two systems are not competitive but can well be complementary. The East Ohio Gas Company operates two storage pools in addition to its liquid plant and has found them very helpful in meeting extremely high demands, but each in its own peculiar way. It might be well to keep this fact in mind as we proceed.

Liquefaction makes it possible to store above ground, and in the center of large consuming areas, greater volumes of natural gas at a lower investment cost than is possible by any other means. Underground storage areas on the other hand, because of the infinitely greater volumes which they can accommodate, make possible sizeable withdrawal rates over a longer period of time and permit larger replacements rates, but such areas are often at some distance from the market to be served and utilize pipe line capacity which may already be taxed in bringing in the normal supply from distant fields.

Gas from liquid storage located in the midst of the consuming area takes up no transmission line capacity, can be fed into the distribution system quickly and in quantities comparable to that which a large diameter pipe line might bring in. Underground storage can provide the sustained elevated demands, but liquid storage can supply the sudden or exceptionally high and usually short peaks occasioned by abrupt changes in the weather such as often happen in the region of the Great Lakes. Thus each method has its advantages as well as its limitations.

Location of Plant

In order that you may better understand the relationship which the L. S. & R. Plant, as we term it (Liquefaction, Storage & Regasification), bears to The East Ohio's system as a whole we have prepared a map showing the location of the main transmission lines, the storage pools and the plant. This plant is situated at the extreme north end of the system; in fact it is on the far north side of the city about midway between the west and east boundaries of the area served. The company receives a large part of its gas supply from West Virginia. It is delivered to the company at the Ohio River at a point about 140 miles from Cleveland, from which point it is transported through 18" and 20" pipe lines.

In addition, the company obtains through a 20" pipe line a sizeable quantity of Texas gas at a delivery point approximately 115 miles west of Cleveland, from which point it is transported to Cleveland. Serving

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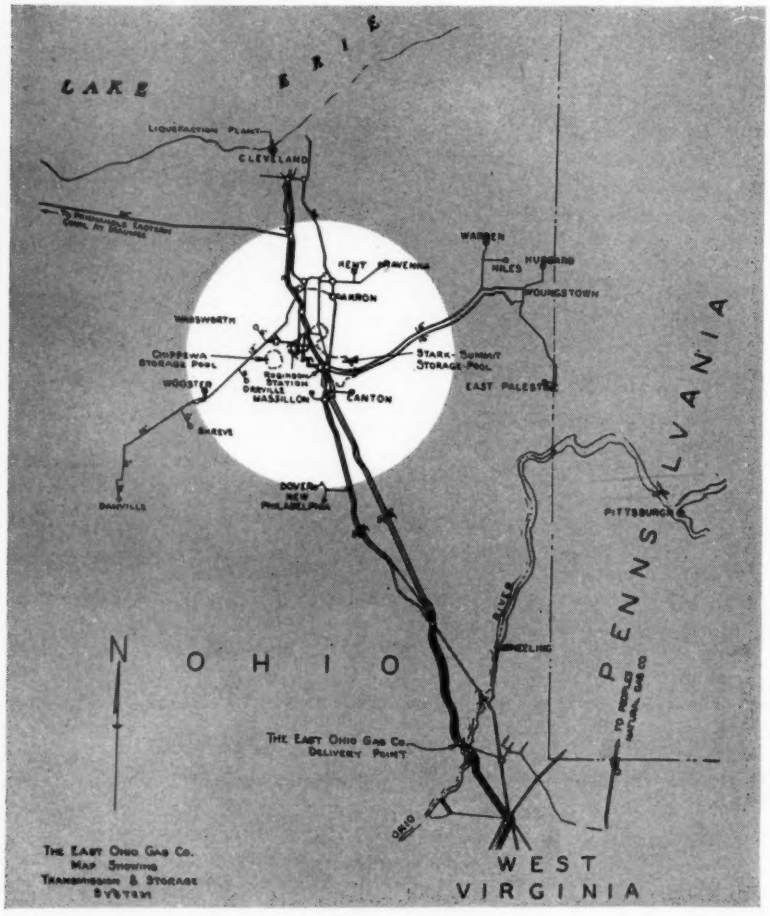
over 537,000 customers, The East Ohio Gas Company system supplies a number of highly industrialized areas including Youngstown, Warren, Niles, Canton, Massillon, Akron, Barberton, Cleveland, all having large steel plants or other highly essential industries. In a locality having 6,400 degree days there are 56,000 house heating systems in Greater Cleveland alone, with 24,000 more in the other towns served. The demand on the system on a zero day will be about 343,000,000 cubic feet or over twice the average daily summer load. The winter domestic load (including house heating) is about five times the summer domestic load.



With this picture before you we may proceed with a description of the manner in which the liquefaction plant is used in maintaining service. The liquefying rate is 4,000,000 cu.ft. per 24 hours, the regasifying rate 3,000,000 cu.ft. per hour. The storage originally provided consisted of three spheres each having a capacity equal to 50,000,000 cu.ft. of low pressure gas. Last fall a fourth storage tank was placed in commission. It is cylindrical in shape, 70 ft. in diameter and 42¾ ft. high. It has double-dished bottom and top to provide for expansion and contraction and is insulated with 3 feet of granulated rock wool interposed between the inner tank and the outer enclosing shell. This container adds 90,000,000 cu.ft. making a total storage of 240,000,000 cu.ft. of low pressure gas.

The plan is to start liquefying early enough in the fall so that the storage tanks will be full in advance of anticipated withdrawals. Since the tanks are filled after the last regasification in the spring this means merely replacing the volume which has evaporated off during the summer months. Because of the vagaries of the weather and the heavy industrial demands occasioned by the war we have found it necessary to regasify as early as October and as late as May but in these fall and spring periods, the total withdrawals are seldom large. The withdrawal on a maximum winter day has run to 38,000,000 cu.ft.

A question often asked is how much gas is evaporated from storage into the low pressure system during standby and what effect it has upon the composition and heating value of the remainder. The gas which boils off continuously from the surface of the liquid in the four containers amounts to about 500,000 cu.ft. per 24 hours. This gas, which is practically pure methane, discharges at storage pressure of 3 lbs. gauge through an atmospheric heater equipped with steam heat control of temperature, through a back-pressure regulator, a Roots meter and then into the low pressure distribution system.

Evaporation Loss Restored

The appreciation in heating value which would result during a three-month standby period would not exceed 4 to 5%, assuming full storage at the start; on 1100 B.t.u. gas this amounts to about 50 B.t.u. per cu.ft. Except in the event of an emergency necessitating regasification during the summer, the loss due to evaporation is replaced before the date of expected use in the fall and the heating value is thus restored very nearly to its original value. When the plant is liquefying all gas evaporating from storage is recycled and returned to storage.

The regasification phase of the process is made possible by the other two phases, liquefaction and storage. It is not a difficult step to carry out but its effect is immediate and marked. Many a gas man whose distribution system hangs on the end of a pipe line has had the experience of watching pressures sag dangerously low during cold snaps. To such a man it would be comforting indeed to be able to maintain normal or

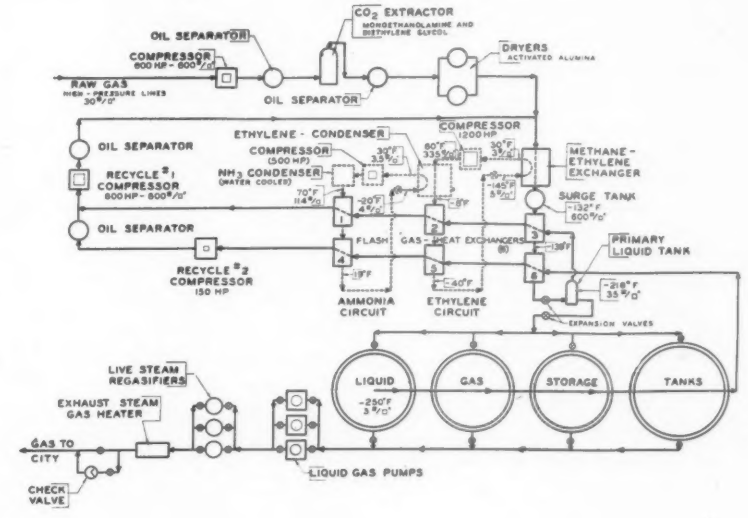
reasonably adequate pressure during such periods. When gas in volumes ranging from 500,000 cu.ft. to 3,000,000 cu.ft. per hour is injected into the mains of a large network at the end of a pipe line system far from the principal pump station, the effect may be likened to that produced when a wounded soldier is given a blood transfusion—it averts the serious after-effects of shock and contributes to his recovery. The effects of transfusion on the gas system are no less impressive and wholesome; with gas being fed into the integrated system from both ends, pressures can be maintained or bolstered all along the way.

During the season of the year when the necessity for regasification may arise any day, the boilers are kept up to pressure (175 lbs.) in anticipation of a sudden call from the Gas Dispatcher and the lift-type steam-driven pumps are kept cooled down by bleeding a little liquid through them into the low pressure system in order that the maximum capacity of the pump may be realized quickly. Unless this is done the pump will pump vapor only and the output will be practically zero until line and pump are cooled to liquid gas temperature.

Three Pumping Units

There are three pumping units so connected that each can draw from a common manifold. Liquid gas flows under storage pressure from the bottom of the storages to the pump suction. The pump then discharges it through one or more of three regasifier units, which are specially constructed heat exchanges mounted vertically. 150 lbs. steam on the outside of the exchanger tubes at once vaporizes the liquid returning it to its original gaseous state. In this reconversion a cubic foot of liquid (7½ gals.) expands about 575 times and absorbs 11,500 B.t.u. The gas thus produced discharges into a 20″ steel main connecting with the city 30-lb. intermediate pressure system, the same system from which gas was withdrawn during off-peak periods.

Each regasifier unit consisting of pump and exchanger will deliver 1,000,000 cu.ft. of low pressure gas per hour making the total output 3,000,000 cu.ft. per hour or at the rate of about 70,000,000 cu.ft. per day. This is roughly 50% more gas than our largest pipe line (20″) normally delivers at the city border station under similar load conditions. The maximum rate of regasification requires the full output of two boilers, rated at 300 BHP and 600 BHP, which deliver about 2,200 BHP or 245% of rating. They are oil-fired during such periods, since gas is at a premium, but are equipped for both gas and oil firing. Air for combustion is supplied by steam turbine-driven blowers.



Determination of the height of liquid in the several vessels at any given time, conversion of the liquid height into equivalent gas volume, and the maintenance of a balance sheet on input, output and stock on hand are, we believe, sufficiently unique to be of interest. The height of liquid, obviously, must be obtained without removing the pressure or opening the vessel. It is simply and quickly done by counterposing a pressure of nitrogen gas downward through a small-diameter copper tube extending from top to bottom. A pressure gauge on this line shows a rise in pressure in inches of water as the nitrogen forces liquid gas down the tube. When the rise ceases it indicates nitrogen in bubbling from the bottom end of the tube. The pressure gauge reads the sum of the static head and the friction head in inches of water. A differential gauge across a small orifice in the nitrogen line makes it possible to adjust the friction head to a constant value for each reading. The pressure in inches of water divided by the specific gravity of the liquid gives the liquid height inside the vessel in inches of liquid gas. A calibration curve for a sphere or a cylinder on which heights in inches is plotted against cu.ft. of liquid tells the volume in storage in terms of cu.ft. but the curve must be frequently corrected because of varying specific gravity of the liquid.

In order to compute accurately the number of gaseous cu.ft. it is necessary to know the percentages of hydrocarbon components in the liquid in order to determine existing expansion ratios and specific gravity of the liquid. Methane has a ratio of 613 cu.ft. of gas per cu.ft. of liquid.

For ethane it is 488, for propane 325. A weighted average for our gas is about 575:1. This value times the cu.ft. found in storage gives the value in equivalent gaseous volume. The constant loss of methane due to evaporation into the low pressure system and its replacement with liquid of slightly variable composition changes the composition and density of that in storage, making it necessary to set up a system of hydrocarbon balance in order that the expansion ratio may be corrected from time to time. Each time that liquid is regasified a Cutler-Hammer calorimeter reading is obtained and used in checking the hydrocarbon balance and hence the expansion ratio.

After three years of experience the mechanics of the process of filling, emptying and refilling have largely become a routine matter, but the decision as to when to regasify and when to stop or when to liquefy and when to stop rests with the management and is administered by the Gas Dispatcher. It was pointed out earlier in this paper that a plant such as this may well serve as a complement of underground storage and ours is, as a matter of fact, serving that purpose.

Storage Pools

You will note from the map that we have two storage pools, one located a short distance south of Akron, the other, and larger one, north and west of Canton. When firm deliveries from all sources are not adequate, withdrawals from these two pools and from liquid storage are arranged in the order of their reserves, the Franklin-Summit pool being put on first, then the Chippewa pool and last the liquid. All of our industrial business has long been on an interruptible basis but is now, of course, subject to the further regulations imposed by W.P.B. Limitation Order U-7. The net result of the combined storage is to reduce the number of occasions on which it is necessary to curtail or interrupt industrial business.

Every effort is made to conserve the amount of liquid in storage and to replace quickly, whenever load and weather conditions permit, that which is withdrawn. This is frequently possible during the winter and has been done at every opportunity. Normal load increases plus those resulting from the war made it very important that the reserves in liquid storage be increased. This was accomplished by the addition last fall of the cylindrical storage tank already mentioned and by liquefying on every possible occasion.

The relationship between storage capacity and the total amount of gas withdrawn from storage during each season varies from year to year, the withdrawals running from two to four times the storage capacity. The periods when gas was available for liquefaction varied from week-ends to two or three weeks. On more than one occasion after regasifying during the early forenoon hours, it was possible to start liquefying by evening. Although this sudden shift from one phase to the other can be done it is not an efficient operation nor one to be accomplished with ease. It takes time to get the six compressor units started and conditions stabilized. The justification for this procedure is, of course, the necessity for laying away every available cubic foot against the possibility of an extended cold snap. Gas available for storage is apportioned to the two storage areas and to the L. S. & R. plant by the Gas Dispatcher who attempts to avoid short off-peak filling periods at the latter.

Since the repressuring equipment can be started and stopped with less delay it is frequently possible to store underground during shorter intervals than is feasible at the Cleveland plant. Unlike a compressing station in which the several units are so connected that one unit may be shut down or started up without materially affecting the others, the six compressors making up the liquefaction plant are interdependent. As a matter of practical operation no one engine can be down very long before it becomes necessary to shut the others down and because of the rather close relationships which must exist between temperatures, pressures and capacities it takes considerable time and expert handling to reestablish efficient operating conditions when operations are resumed after a shutdown.

It might be of interest at this point to discuss briefly the number and calibre of men required to operate the liquefaction plant. Based on a 48-hr. week it requires a force of 24 men distributed as follows: 1 chief engineer; 2 shift foremen; 4 operators; 3 engineers; 4 oilers; 3 helpers; 2 maintenance men; and 5 boiler operators. The chief engineer and the two shift foremen are men of long experience in handling compressors, auxiliary equipment and high pressure gas. They have been with the company many years and were assigned to the plant from other departments in which their experience was akin to that in the new plant. The operators, oilers and helpers were selected from such places as the garage, the fitting department, street department, etc.; the firemen are licensed boiler operators, one being a foreman of long experience.

Running a plant of this kind does not differ materially from that of a natural gasoline plant operated in conjunction with a compressor station. Each requires men familiar with steam and gas-operated equipment, heat exchangers, pressure and temperature recorders and controllers, circulating pumps and the like.

Performance Satisfactory

In general the plant's performance over the past three winters has been satisfactory. Like any plant in which unit sizes and arrangement, apparatus design, pipe sizes, volumes, pressures and temperatures must be worked out from known laws of physics, chemistry and thermodynamics, there were some things which did not function quite as planned, some which varied too widely from the calculated values and others which the designer and the operator wished to change and did change. But the important thing is that the plant has liquefied gas, liquid has been successfully kept in storage and has been regasified when needed; there have been no instances when the plant failed at a critical time with the result that liquid was not available when wanted. Good design, good construction, good operation and good management have combined to produce a pot o' gas at the end of the gas line which has been adequate in the pinches.

Natural Gas Research: Its Importance and Possibilities

R. R. Sayers

THE natural gas industry has advanced a long way in technical research to supply needed fuels and chemical products, showing the same initiative as in the development of measures to protect the health and safety of company employees and of the thousands of natural gas users. The Bureau of Mines has been identified closely with this progress, and for nearly a quarter of a century an uninterrupted series of technical cooperative studies has resulted from the agreement between the Bureau of Mines and the Natural Gas Department of the American Gas Association or its predecessor organizations. The financial support provided under the cooperative agreement has been of great aid in obtaining the facts published by the Bureau in more than 80 technical reports on a wide range of subjects pertaining to the natural gas industry. However, the cooperation goes far beyond the funds supplied; it encompasses the counsel, advice and facilities that the industry generously has made available to the Bureau. These intangible but no less essential evidences of direct help have outstanding significance.

However interesting a detailed review of past cooperative studies might be, a discussion of the importance and possibilities of natural gas research will be served best by taking only such backward glances as may help to broaden the over-all view of work now under way.

By R. R. SAYERS

Director, Bureau of Mines, U. S. Department of the Interior

Condensate Wells

In recent years, the discovery of deep, high pressure gas fields, mainly in the Gulf Coastal regions of Texas and Louisiana, South Texas, East Texas, North Louisiana, South Arkansas and California has presented many new problems. As most of the gas fields discovered up to a few years ago were of the relatively shallow, low pressure type, the gas had a low enough liquid content to be considered "dry" gas, although some hydrocarbon liquid usually is present in most natural gases. Deeper drilling discovered high pressure wells that produced large quantities of liquid hydrocarbons, sometimes called "water-white distillate."

The total liquid hydrocarbon components of the fluid in a reservoir have been found to vary considerably between fields, ranging from 15 to 75 barrels per million cubic feet of gas when measured under standard conditions at the surface of the ground. Some may be even higher. At first many of the wells were produced for the liquid that could be obtained and frequently the gas was vented to the air. As these "freak" or "gasoline" wells were neither oil wells nor gas wells according to the general classification then in use, the term "combination well" was applied to them for a time.

Wells in the Big Lake field of Texas about 1928 displayed peculiar producing characteristics and yielded what then was unusual material. Other fields with similar characteristics followed in rapid succession. Keen, indeed, would have been the foresight of a person who at that time had envisaged the effect on industrial development and fuel economy of some early revelations of what then appeared to be anomalous behavior in these deep-seated, high pressure accumulations now widely referred to as condensate reservoirs.

A condensate reservoir generally is considered to be one in which the fluids under initial pressure and temperature conditions in the reservoir exist in a single phase (all gas). For that reason, the engineers frequently call them "single-phase" reservoirs. The dense gas that occurs there originally has dissolved in it a very light liquid in varying amounts, depending upon the geologic conditions of deposition and upon pressure and temperature conditions in the reservoir. It generally is considered that the fluids exist initially at or near their dew point in the reservoir and that components in certain proportions begin to condense to liquid in the reservoir when reservoir pressure declines. The formation of liquid when pressure decreases at constant temperature is called retrograde condensation.

Sage and Lacey[1] * describe eight types of retrograde behavior. As both pressures and temperatures change during the producing processes, liquids may be separated from gas through retrograde and normal condensation under a wide variety of conditions. Retrograde condensation is "abnormal" only in the sense that it occurs at pressures and temperatures and in mixtures that are outside or beyond the normal range of experience.

Dr. Lacey and his associates did much to clarify technical thinking on the complicated problems relating to the behavior of hydrocarbon mixtures. At first many engineers had difficulty in visualizing the concept of a liquid dissolved in gas. The A.P.I. research project at California Institute of Technology under Dr. Lacey laid emphasis

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* Superior numbers refer to citations in the bibliography at the end of this paper.

on phase equilibria in two-, three-, and multi-component mixtures of pure-hydrocarbons. Dr. D. L. Katz and his associates at the University of Michigan, as well as others, have contributed much to the fundamental concepts of this problem, using various mixtures.

The Bureau of Mines, recognizing the importance of condensate fields, began studies relating to their behavior several years ago. Some preliminary findings and concepts regarding phase relations were brought to the attention of the Main Technical and Research Committee of the Natural Gas Department of the American Gas Association in 1937.[2] Later, Eilerts and Smith[3] demonstrated changes of phase or state from gas to liquid or from liquid to gas, using a three-dimensional model made of glass. This and other reported work required an equilibrium cell[4] which Bureau engineers designed and constructed. Gas and liquid collected at the oil-gas separator in the field were compressed in the laboratory cell and returned to the initial pressures and temperatures of the reservoir whence they came.

Thus, the Bureau's work, in which the Association has cooperated, has been mainly on samples of oil and gas mixtures from wells, and the studies have been made to determine how the resulting data may be applied in development and operational problems in condensate-type fields. In this way, making use of all available findings, fundamental concepts are being linked with practical applications.

Engineers and scientists have come a long way along the road of knowledge in the six years since the Bureau of Mines published its first report on a "combination" well.[5] Because of the increased understanding of the characteristics of the components and the behavior of condensate reservoirs that resulted from the cooperative research, the Bureau was prepared for its war work on these subjects.

War Work on Condensate Fields

Shortly before the United States entered the war the Office of the Petroleum Coordinator (now the Petroleum Administration for War) formally requested the Bureau of Mines to study condensate fields to obtain the preliminary estimates of reserves, both gas and liquid; to make as complete analyses as possible of the flow characteristics and properties of the gas and liquid; and to determine the suitability of the liquefiable fractions as sources of blending components in the manufacture of high-octane aviation gasoline. Conferences of engineers representing the Bureau and the Petroleum Administration for War were held, and a tentative outline of work was developed.

R. E. Heithecker was placed in direct charge of the field studies, and members of the staff of the Petroleum Experiment Station, Bartlesville, Okla., assisted by cooperative employees of the Association, started to work immediately despite the lack of adequate field-testing equipment. Nevertheless, tests were made in three fields and reports submitted within 12 months. The petroleum refining group at the Bartlesville Station furnished augmenting data showing the possibilities of these condensates as sources of high-octane aviation base stock. During that time also, the whole staff of the Dallas (Tex.) petroleum field office of the Bureau was assigned to engineering studies in condensate fields.

Portable Laboratory

Although the information obtained from the first three fields served immediate objectives, the engineers of the Bureau and the Petroleum Administration for War realized that a portable field laboratory should be built (1) to obtain data that would offer guidance in preventing significant losses of valuable components as the reservoir pressure is reduced and (2) to yield technical information from which efficient cycling plants could be planned and designed. Accordingly, the Bureau designed and constructed a portable field laboratory[6] which to date has been used in measuring the properties of fluids in five wells.

The reservoirs studied by the Bureau of Mines are selected according to their importance by engineers of the Petroleum Administration for War. The data regarding the quantity and quality of recoverable condensates from the reservoir fluids are used by that agency and operators in planning development programs and help them to reach decisions regarding the possible construction of cycling plants and recovery systems or the enlargement of present installations. Before a field is studied, the Bureau engineers visit the executives of the companies operating in that field and discuss its problems and pertinent features. Permission is obtained to collect the essential engineering data, to test the selected wells, and to take samples of the gas and liquid for later additional examination. All interested companies in a field obtain copies of the preliminary reports upon completion of the study but these are not being distributed widely to the public because it is believed that the specific data are of immediate interest only to those directly responsible for the developing the field.

Perhaps the surest way to show that the work, in which the Natural Gas Department of the American Gas Association has cooperated so wholeheartedly, is in the right direction is to quote Ralph K. Davies, Deputy Petroleum Administrator. His recent letter follows:

> The Natural Gas and Natural Gasoline Division informs me that it has received not only fine cooperation from members of your staff but also very high caliber engineering and technical work.
>
> Not only this office but the entire natural gas and natural gasoline industry has benefitted to a substantial degree by the availability of the Bureau's technical knowledge and skill at a time when the industry itself finds it extremely difficult to maintain adequate technical personnel.

Future Possibilities

The question has been raised upon several occasions, "Will the Bureau study condensate fields after the war?" These studies, now being made with as careful precision as time and equipment will permit, are no more than a threshold approach to an important phase of the national fuel economy. Years of investigation and research on these types of reservoirs lie ahead before many of the fundamental facts will be known relating to their operation and behavior. Each reservoir requires different treatment, and the Bureau's engineers feel that they are obtaining only the bare, essential facts regarding any particular one studied under present conditions. A new device which they hope may be added to

their equipment soon is an auxiliary portable cell for measuring properties of reservoir fluids at temperatures which now cannot be reached because of difficulties resultant from the formation of hydrates. The data expected to be obtained with such equipment would facilitate correlations extending the usefulness of data now available from operation of the field equipment in service.

The importance of condensate fields is shown by a recent tabulation[7] which indicates that 39 cycling plants are in operation or under construction. The combined daily capacity of these plants totals approximately 5,000,000 gallons or 120,000 barrels. It is believed that there are many other fields in which the liquid content is high enough and the physical characteristics of the reservoir are such that cycling would be successful if the essential engineering data were known and a plan of unitization was agreed to by the operators and royalty owners. Despite the legal work involved, which sometimes takes months or even years to complete, the properties should be unitized before many wells are drilled. The spacing patterns of both producing and injection wells are important factors in a successful cycling program and depend upon the characteristics of the reservoir and its contained fluids; all require engineering research.

The type of field testing that now is an essential part of the war program should not become routine procedure. Such an end point has never been the objective of the cooperative work, as shown by the expressed views of the members of the Main Technical and Advisory Committee of the Natural Gas Department of the Association who are alert to the needs of today and tomorrow. From the mass of data that have been and are being assembled for preparation of the preliminary restricted reports, a series of progressive studies should be developed that will appreciably prolong the life of the natural gas industry.

Other Problems

Most of the preceding discussion has been in terms of the liquid components of condensate reservoirs. What of the cycled gas that will remain in the reservoir sands after the liquid fractions have been removed? Bureau of Mines engineers believe that a wide horizon of research that will pay high dividends remains to be explored in methods of predicting the progressive distribution and concentration of residual gases returned to reservoirs of various types. In other words, it is important to know in advance when cycling will become recycling and to predetermine the progressive change of the over-all extractable liquid content of the gas produced throughout the profitable life of the recycling operations. Eventually a gas-liquid reservoir will be changed into a reserve of relatively dry gas to be drawn upon for gaseous fuel and for raw material in chemical synthesis. Experience in operating condensate fields has not covered many years, and it is very important to determine the probable reserves of the dry gas. Moreover, the Bureau's engineers believe that the ultimate success of some cycling and recycling projects may depend upon the solution of gas-input problems and that more work should be done on them.[8]

Monumental Research

A fascinating attribute of research is that it changes continually as new conditions reveal frontiers of exploration not seen or beyond reach at the start. This condition is typified by the monumental work of the Bureau of Mines and the Natural Gas Department of the American Gas Association on methods of ascertaining open-flow capacities of natural gas wells without actually opening them to the atmosphere. The results of that study were published in 1936 in Bureau of Mines Monograph 7.[9] The conservation of natural resources and the protection to life and property have been increased immeasurably by widespread use of the back-pressure method of computing open-flow capacities of gas wells.

One basic requirement in testing gas wells by the back-pressure method, as outlined in Monograph 7, is that the maximum of the various rates of delivery used in the test reduces the pressure at the face of the sand to 70 or 75 per cent of the pressure when a well is closed in. This requirement was easily met in most wells when this pioneer work was done, because virtually all of the gas fields were of the shallower, lower-pressure type, but it is impossible to reduce the pressure at the face of the sand 25 or 30 per cent in many of the high-pressure, "wet" gas wells which have been drilled in the last few years.

Aware of these new conditions, the Bureau now has in the course of publication a preliminary report[10] showing the magnitude of error possible in calculating open-flow volumes by the back-pressure method when such tests are made without producing a well at a rate high enough to give the required "draw-down" in pressure at the face of the sand. Monograph 7 remains an outstanding report, but additional research must be undertaken to determine satisfactory methods of testing high-pressure, large-volume gas wells, considering factors that have come to the fore since its publication.

The effect of condensed water vapor on gas-recovery operations also is a technical problem to which some thought has been given. Its importance may become greater if this water is found to contribute to the internal corrosion of well-head fittings and other equipment in wells producing from condensate-type reservoirs. This condition entails expense in the replacement of corroded fittings, is an ever-present menace to workmen in the production departments and offers the possibility of uncontrolled wells wasting tremendous volumes of natural resources. Fortunately, as yet no blowouts and resultant injuries to workmen from this cause have been reported, but fittings have been found so badly corroded that it appeared almost impossible for them to withstand the well pressure. A baffling situation is that evidences of corrosion are found in some fields and not in others where conditions appear to be similar. The true cause and means of combating this corrosion problem will be found through research of the caliber manifest in the natural gas industry.

Natural Gas Reserves

A general discussion such as this dealing with the importance and possibilities of natural gas research would be incomplete if no reference, however brief, were made to the vital question of reserves. It is noteworthy that despite withdrawals, the Nation may even now count its reserves at 110 trillion cubic feet, according to

estimates compiled by industry committees at the request of the Petroleum Administration for War. However, such figures never remain static. From a research view as well as that of practical economy, a main concern should be the *availability* of natural gas. Rawlins[11] presented a scholarly treatment of this subject in 1937. Since that paper was written much has been learned and applied, but as J. H. Dunn in his discussion of Rawlins' paper pointed out:

> Then if we have, as Mr. Rawlins expresses it, "a better understanding of the basic relationships in the reservoirs that affect delivery capacities" we may expect to extract the greatest quantity of gas at the least cost.

Regardless of the Nation's known reserves of natural gas at the end of the war, there will be a continuing need for current reliable estimates not only of their extent but especially of their availability. The studies of condensate fields will be a long step forward in that direction, but if several parties of engineers equipped with suitable instruments could determine the flow characteristics of selected wells in the major oil and gas fields of the country and if these data were combined with other obtainable information, an inestimable service would be rendered in planning the future use of the natural gas resources of the country in accordance with the needs for fuel and source materials for chemical products.

Natural Gas "Substitutes" for Petroleum Products

As the demands of war have directed mounting attention to the limited supplies of available liquid petroleum, interest has increased in many quarters regarding the availability of supplies of natural gas that may be obtained at low cost and converted into liquid and solid hydrocarbons. For example, the conversion of natural gas into liquid products by gas synthesis† has wide possibilities for using gas of low market value which otherwise might be wasted or employed inefficiently.

This process for manufacturing hydrocarbon products comprises two distinct operations. In the first, a mixture of carbon monoxide and hydrogen, called water gas, is made by reaction between steam and carbonaceous material coal, lignite, coke, or natural gas can be used in this step, and after purification the product is the same regardless of which type of raw material is used. The second step actually is the synthesis. In this operation, the purified water gas, in the presence of a solid catalyst or mixture of catalysts in a reacting vessel, is converted into a mixture of gaseous, liquid, and solid hydrocarbons. The product of this reaction varies in composition depending on the ratio of carbon monoxide to hydrogen in the water gas, the nature of the catalyst, and the temperature and pressure of operation. Pressures now used are between 1 and 15 atmospheres, absolute. The products obtained are motor fuel, Diesel fuel, liquefiable gases, and paraffin wax.

The Bureau's research on the process has dealt mainly with the chemical and engineering problems of the synthesis. Some promising results of small-scale experimentation, particularly with respect to various catalysts, have been obtained. Larger-scale pilot plant development work is now in progress, with the view of exploring the possibilities of obtaining not only Diesel fuel but high-octane gasoline.

The possible use of liquefied natural gas, high in methane, directly as motor fuel may have some relation to the liquefaction of natural gas which is stored in tanks and used as "make up" to meet peak loads. Liquefaction of natural gas is not a new subject. Clark and Miller[12] described in detail the Cleveland plant of The East Ohio Gas Company before the American Gas Association at Atlantic City in October 1940, and Laverty and Edmister[13] have shown the use of Mollier diagrams in the design and operation of such plants. However, the utilization of natural gas in mobile equipment introduces other factors.

For many years the Bureau has received inquiries regarding the use of liquefied natural gas as motor fuel. Aside from the economic barrier of the low price of motor gasoline, which tended to discourage this use, there seemed to be two practical difficulties. The first was the energy required to liquefy natural gas, and the second was the design and construction of suitable containers. The first problem has been solved, as mentioned, and it now appears that certain types of fuel tanks, based upon the principle of the "vacuum bottle" may have practical value. In fact, such equipment has been investigated extensively in Great Britain.

A serious hazard presents itself immediately because of the explosive mixture of air and excess gas that would be formed as the methane continued to vaporize whenever the engine which propelled the vehicle did not use all of the regasified material as fuel. Before this use of natural gas in the United States can have wide application as a supplemental automotive fuel, research will have to develop suitable methods that will eliminate the hazards attending the escape of inflammable gases to the air. Although the need for applying the results of this kind of research does not appear imminent, any facts that can be developed now on this problem will contribute to natural gas utilization in future.

Concluding Statement

So many technical and economic problems loom before us in an ever-changing world that this paper has done little more than name a few. The list of undiscussed topics includes the cooperative work on gas hydrates which has to be recessed because of the urgent program of building and operating helium plants. The research of W. M. Deaton and E. M. Frost of the Bureau of Mines on gas hydrates is well known throughout the natural gas industry, and the Bureau is reminded constantly of the beneficial results of their contribution. The day will be welcome when conditions will permit a return to this or equally important research dealing with natural gas transportation.

Although this paper necessarily has dealt more with generalities than with strict technical statements, some of its major points may be of value in anticipating a time when the natural gas engineers and scientists of the Bureau of Mines and the Natural Gas Department of the American Gas Association may review, augment, and publish material now being collected primarily to aid in shortening the war. A free exchange of ideas should be mutually

† Also called the Fischer-Tropsch method.

helpful in returning, when the opportunity offers to peace activities in the research dealing with the fuel economy of the country.

BIBLIOGRAPHY

(1) Sage, Bruce H., and Lacey, William N., Volumetric and Phase Behavior of Hydrocarbons, Stanford University Press, 1939, pp. 291-294.

(2) Berwald, W. B., Schellhardt, M. A., and Eilerts, Kenneth, Manuscript Report, Deliveries from Combination Gas and Oil Wells; see Proceedings, Natural Gas Section, Am. Gas Association, 1939, p. 183.

(3) Eilerts, Kenneth, and Smith, R. Vincent, Specific Volumes and Phase-Boundary Properties of Separator-Gas and Liquid-Hydrocarbon Mixtures, Bureau of Mines Rept. of Investigations 3642, 1942, 57 pp.

(4) Eilerts, Kenneth, Smith, R. Vincent, and Wright, R. C., Equilibrium Cell for Investigating Properties of Fluids from Petroleum and Natural-Gas Reservoirs, Bureau of Mines Rept. of Investigations 3514, 1940, 30 pp.

(5) Eilerts, C. K., and Schellhardt, M. A., Flow Characteristics, Composition, and Some Liquid-Phase Properties of Hydrocarbon Fluids from a "Combination" Well, Bureau of Mines Rept. of Investigations 3402, 1938, 34 pp.

(6) Eilerts, Kenneth, and others, Portable Equipment for Measuring Properties of Fluids from Gas-Condensate Wells, Am. Gas Association Monthly, April 1944, pp. 148-152.

(7) Oil and Gas Jour., Survey of Cycling Plants, April 13, 1944, p. 292.

(8) Schellhardt, M. A., and Rawlins, E. L., Comparison of Output and Intake Characteristics of Natural-Gas Wells in Texas Panhandle Field, Bureau of Mines Rept. of Investigations 3303, 1936, 25 pp.

(9) Rawlins, E. L., and Schellhardt, M. A., Back-Pressure Data on Natural-Gas Wells and Their Application to Production Practices, Bureau of Mines Monograph 7, 210 pp., First ed. 1936, reprinted with minor corrections and revisions, 1939. Am. Gas Association.

(10) Schellhardt, M. A., Application of the Back-Pressure Method for Determining Absolute Open Flows of Large Gas Wells, Bureau of Mines Rept. of Investigations, in press.

(11) Rawlins, E. L., Gas-Reserve Problems Dealing with the Availability of Natural Gas from Gas Reservoirs and Conservation of Gas in Its Occurrence with Oil: Am. Gas Association, 1937, 8 pp.

(12) Clark, J. A., and Miller, R. W., Liquefaction, Storage and Regasification of Natural Gas: Oil and Gas Jour., Oct. 17, 1940, p. 48; Gas Age, Oct. 24, 1940, p. 46; Am. Gas Jour., November 1940, p. 52; Gas, November 1940, p. 28.

(13) Laverty, F. W., and Edmister, W. C., The Liquefaction and Regasification of Lighter Hydrocarbons, Oil and Gas Jour., Sept. 4, 1941, pp. 35, 38-39, 53, 55-56, 58.

Discussing the booklets with a consumer are Mrs. Arra Sutton Mixter, Hartford Gas Company home service director, Mrs. Robert F. Gadd, chairman Women's Division, Hartford War Council, and Miss Erna Fisher, Hartford Electric Light Company

Hartford's Consumer Information Centers

THE Hartford Gas Company has taken another step in aiding the war effort on the home front by cooperating with the War Councils of Hartford and Manchester (Conn.) in establishing consumer information centers. For some time the War Councils have been desirous of setting up such centers and committees have been at work planning and promoting the project. Members of the Gas Company Home Service Division, Mrs. Arra Sutton Mixter and Mrs. Irene E. Kennedy in Hartford and Miss Alyce Salisbury in Manchester, served on these committees.

The objective was to find a central place for disseminating all available information on consumer problems—foods and nutrition, care of household equipment, salvage, care and conservation of clothing, OPA information, war gardens, food preservation, social service and child welfare, and even a swap shop. The Hartford Gas Company offices were considered the logical places for these centers.

Hartford's Consumer Information Center was formally opened Thursday, April 6, with a luncheon served to 100 guests and committee members in the auditorium of The Hartford Gas Company. Mrs. Robert F. Gadd, chairman of the Women's Division of the Hartford War Council, presided; Secretary of State Frances Burke Redick was the principal luncheon speaker, and remarks were made by Norman B. Bertolette, president of The Hartford Gas Company and others.

More than seventy women's organizations of greater Hartford are providing volunteers to staff the Hartford Center which is open to the public Monday through Friday from 12 to 4 o'clock. These club volunteers, under the leadership of a capable chairman, have been trained in the work they are to do under the supervision of Arra Sutton Mixter of The Hartford Gas Company and Erna Fisher of the Hartford Electric Light Company.

Howard R. Carlson, general sales manager of the Gas Company, has not only donated a large floor space for the projects but has also contributed very attractive booths and backgrounds in red, white and blue. Hartford's display is flanked on one side by a panel with a giant "Daily Seven Reminder Food" wheel and a panel at another side is devoted to use as a billboard for timely and appropriate posters.

The Information Centers were given wide publicity in all the local papers and the Gas Company itself not only inserted advertisements in the newspapers but further cooperated by donating an eye-catching window.

Hartford's Consumer Information Center

Instruments for Determination of Specific Gravity of Gases*

By R. M. CONNER

Secretary, American Society for Testing Materials Committee D-3 on Gaseous Fuels

DETERMINING, indicating, and recording specific gravities of gaseous fuels are procedures that lie close to the heart of the gas industry. They play an important role in the derivation of scientific premises on which operating decisions and plans for future developments largely depend. Long a subject of major consideration by engineers, recent activities of Committee D-3 on Gaseous Fuels of the American Society for Testing Materials have greatly stimulated interest in improving instruments for specific gravity measurement.

Standard Procedures Objective

The committee was organized to develop standard methods and procedures for determination of various physical and chemical properties of gaseous fuels. Those covering specific gravity were assigned to Subcommittee IV on Determination of Specific Gravity and Density of Gaseous Fuels of which E. F. Schmidt, vice-president and operating manager of the Lone Star Gas Company is chairman. After a survey of the field it was decided that a critical study of instruments available was one of the most important matters to be initially undertaken. Arrangements were made with the National Bureau of Standards for a study of available instruments, this program being conducted under the committee's supervision. Loan of instruments was negotiated through the committee while the Bureau supplied equipment and personnel.

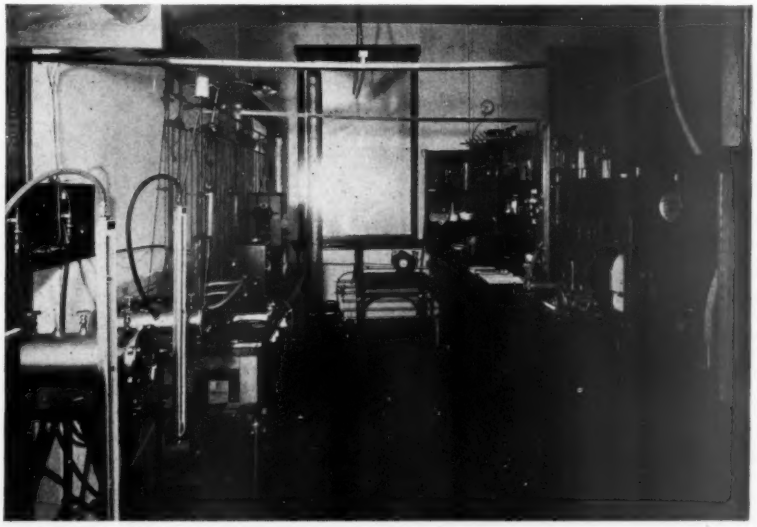
Due to the elaborate nature of this investigation, some 18 months were required for its completion. In February, 1942, a 240-page mimeographed report was issued by the National Bureau of Standards for limited distribution. This included full descriptions of the instruments studied and the test equipment and procedures employed in addition to presenting detailed experimental data. As, under present conditions, publication of the complete report has not been practical, this abstract has been prepared at the request of the committee for the purpose of acquainting those interested with the results of this very valuable contribution. It is expected that the complete report will later be available in published form.

Test Gases

Fifteen test gases were used in the study. These gases with their compositions and specific gravities as determined by weighing are shown in the table at the bottom of the next page.

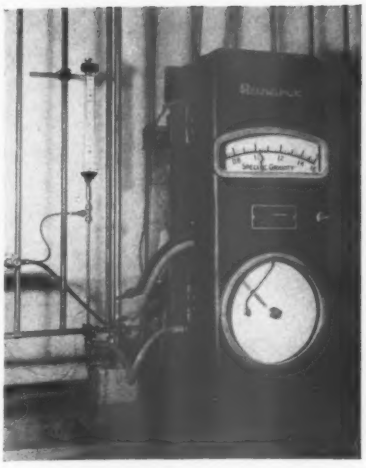
For convenience in maintaining a test mixture of constant specific gravity and determining such gravity by independent means, all test gases were dry. To provide a reproducible and unchanging standard of reference by which all specific gravity data could be placed on a common basis for comparison, the specific gravity of each test gas was determined by reference to dry air, free from carbon dioxide.

Specific gravity of the test gases was determined by differential weighing in glass globes. Two such globes of substantially the same weight and volume were filled; one with air, the other with the test gas under consideration and their difference in weight determined. The same procedure was then repeated with contents of the bulbs interchanged. In this manner correction for buoyancy effects was eliminated, temperature and pressure effects

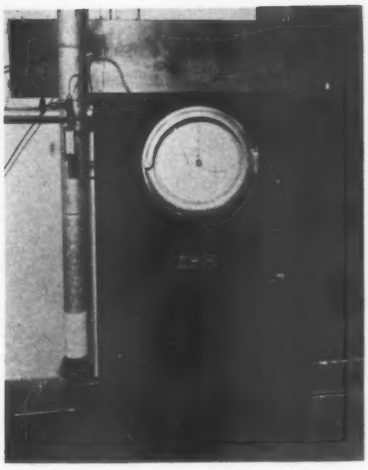


General view of arrangement of instruments, distribution lines and other facilities for testing instruments for determination, indication and recording of specific gravities of gases at Bureau of Standards.

* Abstracted from "Report on Tests of Instruments for the Determination, Indication, or Recording of the Specific Gravities of Gases" by F. A. Smith, J. H. Eiseman, and E. C. Creitz of the National Bureau of Standards in cooperation with The American Society for Testing Materials Subcommittee D-3-IV, Determination of Specific Gravity and Density of Gaseous Fuels.



Ranarex Specific Gravity Recorder No. A2360



Ac-Me Recording Gravitometer No. 271

Ranarex Portable Specific Gravity Indicator No. P1284

were minimized, while weights of the bulbs became of secondary importance. Preliminary to weighing, bulbs were immersed in a water bath to maintain constant temperature. All possible precaution to avoid variations in weight due to handling and other effects were taken.

Assuming that the various errors introduced by weighing and temperature and pressure observations were of the same direction, it was found that a reproducibility of ± 0.00007 in the resulting specific gravity could be expected.

Instruments Studied

Instruments studied in this investigation were secured through the cooperation of their manufacturers. Eleven in all, produced by seven different manufacturers, were examined. They are believed to represent all types in common use. Names of the manufacturers and the instruments supplied are shown in the table on the next page.

After necessary preliminary arrangements had been made, each manufacturer was invited to send a representative to inspect the installation and testing program. Three of the seven manufacturers took advantage of this opportunity.

General Test Procedure

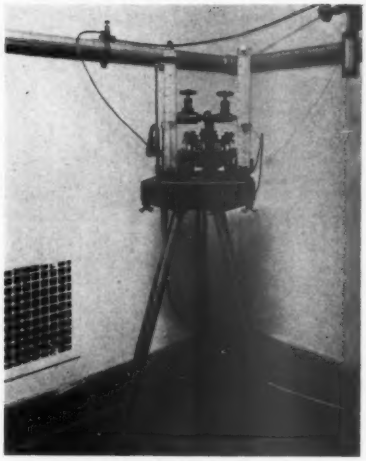
Each instrument was tested with the test gases falling within its specific gravity range, at a "normal" temperature of 77° F. In addition, where applicable, tests were also made in air having a water vapor content of 1.1% corresponding to a normal relative humidity of 35%. Test gases Nos. 1 and 2 were also employed to test instruments at temperatures above and below 77° F. to determine their temperature coefficients. These particular test gases were selected because they represented typical fuel gases with specific gravity in the most commonly encountered range between 0.60 and 0.70. In addition these gases were also used for tests in air having a relative humidity above and below 35% in arriving at their humidity coefficients. Test gas No. 8 was prepared to have a specific gravity close to that of test gas No. 6, but a considerably different viscosity. In this way a comparison of results would indicate the effects of viscosity on the readings of the instruments.

Tests of each individual instrument consisted of 10 specific gravity determinations, 5 made by one observer and 5 by another. Efforts were made in all cases to determine the best performance of which the instrument was capable after fully considering all influencing factors. A mean of the 10 determinations was compared with the known specific gravity of the test gas to obtain the "error" of the instrument under the conditions of test. The "error" thus served as a measure of accuracy. The 10 determinations with their mean were employed to determine the probable error of the mean and that of a single determination. These figures thus serve as a measure of reproducibility of precision of the instrument.

Results of study of 11 instruments using 15 test gases are presented in full in the report as shown by use of

No.	*Test Gas*	*Composition*	*Specific Gravity*	*Probable Error*
3	Helium	He 98.3%, N_2 1.7%	0.1526_2	± 0.00006
4	Helium-nitrogen	He 80.0, N_2 20.0	$.3048_0$	$\pm$ .00004
5	Do.	He 65.9, N_2 34.1	$.4222_6$	$\pm$ .00003
6	Do.	He 44.5, N_2 55.5	$.6007_0$	$\pm$ .00007
8	Hydrogen-carbon dioxide	H_2 63.1, CO_2 36.9	$.6080_5$	$\pm$ .00009
1	Synthetic typical mfd. gas	CH_4 9.11, CO 29.96, H_2 34.59 O_2 0.55, N_2 5.74, CO_2 4.44 C_2H_6 2.64, C_2H_4 12.96	$.6475_0$	$\pm$ .00007
2	Synthetic typical nat. gas	approximate: CH_4 79.4, C_2H_6 14.7, C_3H_8 2.9, N_2 2.4, CO_2 0.5	$.6820_0$	$\pm$ .00005
7	Helium-nitrogen	He 21.1 N_2 78.9	$.7962_6$	$\pm$ .00001
9	Nitrogen	atmospheric, fractionated, water pumped	$.9666_4$	$\pm$ .00001
10	Nitrogen-carbon dioxide	N_2 76.4, CO_2 23.6	1.0982_0	$\pm$ .00002
11	Do.	N_2 44.1, CO_2 55.9	1.2791_5	$\pm$ .00005
12	Do.	N_2 22.9, CO_2 77.1	1.3983_9	$\pm$ .00003
13	Carbon dioxide	commercial	1.5268_0	$\pm$ .00002
14	Propane	Phillips, C.P. reputed 100%	1.5460_9	$\pm$ .00003
15	Butane	" " " 99.5% normal–, 0.5% iso-	2.0644_4	$\pm$ .00007

Manufacturer	*Instrument Supplied*
American Meter Co. Metric Metal Works Erie, Pa.	Metric Indicating Gravitometer
American Recording Chart Co. 3113 E. 11th St. Los Angeles, Calif.	Anubis Portable Gas Balance No. 115 Anubis Recording Gas Gravitometer
Fisher Scientific Co. 711–23 Forbes St. Pittsburgh, Pa.	Fisher Densimeter (Experimental)
The Permutit Co. 330 W. 42nd St. New York, N. Y.	Ranarex Portable Specific Gravity, Indicator No. P 1284 Ranarex Specific Gravity Recorder, No. A 2360
The Refinery Supply Co. 621 E. 4th St. Tulsa, Okla.	Ac-Me Recording Gravitometer No. 271 Ac-Me Gravity Balance No. 3511 Ac-Me Jr. Gravity Balance No. 4041
Sigma Instrument Co. Letchworth, Herts, England	Sigma Recorder No. 7, for Specific Gravity
Arthur H. Thomas Co. West Washington Square Philadelphia, Pa.	Edwards Gas Density Balance No. 763



Metric Indicating Gravitometer

some 52 tables and charts. Corrections applicable to the various tests and their evaluation are presented in detail. They include derivation of equations for compensation of water vapor and carbon dioxide, pressure and chart corrections, and studies of temperature coefficients as well as treatment of other sources of error. Certain corrections were applicable to individual instruments only depending on their type of operation. Liberal use is made of graphs.

Results of Tests

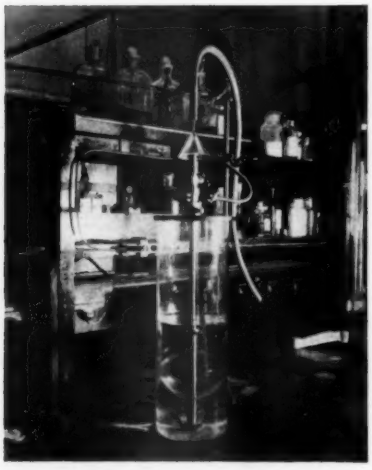
To facilitate presentation of the data, various instruments were arranged in groups according to the type involved and the sort of corrections applicable.

The first group consisted of 3 balances, the Edwards, Ac-Me Junior and Ac-Me Senior, all being identical in principle. In each a beam carrying a bulb is brought to balance in the same position successively in air and in gas by adjusting the pressure in the balance case. Pressures are determined by means of a barometer and a mercury-filled manometer. Instruments differ in size, method of supporting the balance beam, sealing the balance case and other minor constructional features. They are, however, subject to corrections and errors of the same nature though not necessarily of the same magnitude.

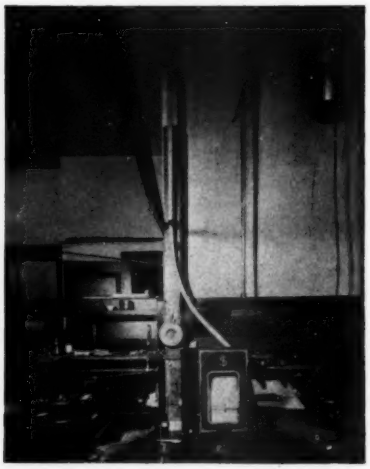
Each of the 3 balances was operated with different types of gases, at different specific gravities and different temperatures and with the beam balanced in air both below and above atmospheric pressure.

Errors of the instruments, uncorrected and after application of correction for the temperature of the mercury in the manometer and for carbon dioxide in the reference air were plotted for each test gas. Complete summaries of the results were tabulated. Except for differences between the thermal expansions at constant pressure of the gases themselves and that of air and the effect of temperature on the manometer, there appeared to be no reason why measurements made with specific gravity balances of this group should be affected by temperature. Additional determinations indicated such effects might safely be disregarded.

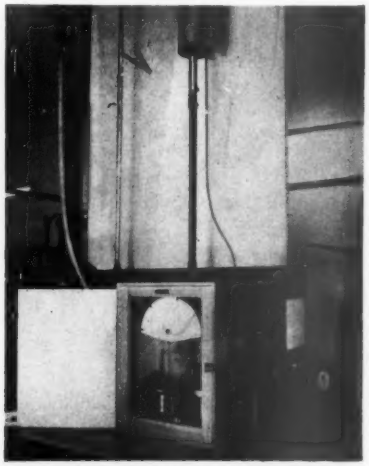
Four instruments comprised the second group. These were the Anubis



Fisher Densimeter (Experimental)

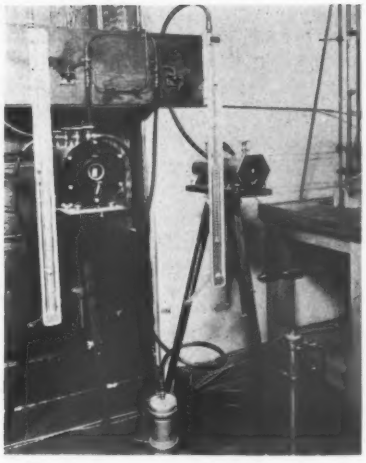


Sigma Recorder No. 7 for Specific Gravity



Anubis Recording Gas Gravitometer

Edwards Gas Density Balance No. 763



Ac-Me Gravity Balance No. 3511
Ac-Me Jr. Gravity Balance No. 4041

Portable Gas Balance, Anubis Recording Gas Gravitometer, the Ac-Me Recording Gravitometer and the Sigma Recorder. These in principle balance a given volume of gas with atmospheric pressure by a displacement of the center of gravity of a balance beam. The amount of this displacement or deflection, subject to correction, measures the specific gravity. This group includes much greater differences than the first in manner of construction and method of compensating change in atmospheric conditions. It does not permit as much generalization with regard to corrections and sources of error. In the case of the Ac-Me Recorder the working force which operates the instrument is the difference between the weight of gas in a float and an equal volume of the surrounding air. The Anubis Recorder and the Sigma Recorder utilize a gas column instead of a float. While in general changes in temperature and pressure change this force, they also change similar factors in compensating mechanisms so that if the action of the mechanism is what it was designed to be, the instrument continues to represent correctly the ratio of the density of gas to that of "standard" air, free of water vapor and carbon dioxide.

All possible sources of error were investigated and tabulated in detail. For exacting work under conditions where the reference air contains water vapor and carbon dioxide and hence its density is changed, methods of determining the proper correction in each instance were formulated. To check further on corrections devised for calibration errors as well as the degree to which the instruments are independent of temperature changes, their temperature coefficients were determined. This procedure consisted of tests made above and below 77° F., some at substantially constant water content of the reference air equivalent to 36.5% relative humidity at 77° F. and some at substantially constant relative humidity.

Specific gravity and vapor pressure changes due to evaporation in sealing liquid used in the three recording instruments in the group are studied and discussed. Likewise the effects of humidity and temperature on the charts of the recorders and other effects such as pen adjustment and of the amount of ink in the pens were likewise considered. Numerous other factors peculiar to certain instruments of the group were studied such as those of leveling instrument, friction, beam, deflection, care in making readings, recalibration for changes in range of the gases tested, and correction of errors due to use at barometric pressure other than that at the time of calibration.

Nine test gases were used in testing the Anubis balance and the Ac-Me recorder, gases Nos. 3, 4, 5, 13, 14 and 15 being outside the range of the instruments. Nine were also used in testing the Anubis Recorder. Three test gases only, Nos. 5, 6 and 8 were employed in testing the Sigma recorder, the others being outside of its range.

A third group of instruments tested included the Metric gravitometer, the Ranarex Recorder and the Ranarex Portable Indicator. This type of instrument depends on pressure developed in stopping movement of gas which has been set in motion by a rotary blower. Very different construction is employed by the Metric and Ranarex devices.

The same careful analysis of working forces, mechanical limitations and derivation of corrections for errors of all kinds to determine the best of which the instruments are capable stands out in the treatment of this group as it does on all others. Air entering the Metric blower is neither dried nor free of carbon dioxide and hence is subject to change with changing water content and carbon dioxide content of the reference air. The mean observed value therefore is corrected to a dry basis. The Ranarex recorder and Ranarex indicator, which are identical in principle, are designed to saturate both gas and air with water. They can be calibrated to indicate

Anubis Portable Gas Balance No. 115

either the relative density of the gas (dry or saturated) as compared with air which is saturated at the existing temperature and pressure, or the specific gravity of the gas (dry or saturated) referred to dry air.

Temperature and humidity coefficients, range of calibration of instruments, and effects of viscosity were other factors investigated. In the case of the recorder, the effect of relative humidity on its chart was studied in a similar manner to that employed in the other recorders. Thirteen test gases were found applicable to the Metric gravitometer, the exceptions being No. 9 and No. 15. For the latter, the sampling rate exceeded the rate of sup-

ply. Test gases for the Ranarex recorder included all except Nos. 3 and 15 and all except Nos. 3, 14, and 15 for the indicator.

The final instrument tested, the Fisher experimental densimeter, was of the type also called an "effusiometer" and more commonly referred to as a "Shilling apparatus." In this instrument the intervals of time required for identical volumes of gas and air to flow through a small orifice are observed. The square of their ratio is the approximate specific gravity of the gas. All fifteen gases were used in the tests of this instrument. Gas and air were saturated with water vapor during observations. Accuracy and reproducibility of the instrument was charted under different conditions of temperature. Variables studied and charted included barometric pressure, water temperature and effusion time.

Instruments Vary Widely

The instruments tested vary widely depending on the service for which they are designed and the conditions under which they are intended to perform. Some are portable, others are designed for permanent installation. Both recording and indicating types are represented. While in some instances they are employed for obtaining quick results, in others the highest accuracy is demanded. In view of the widely varying types of designs involved and the conditions of usage represented no opinions can well be expressed regarding their relative merits. Rather, facts have been presented in order that the characteristics of each instrument may be considered in connection with the individual requirements of the interested user.

In the course of these tests, certain information was obtained which permitted offering suggestions to the manufacturer involved for further development and improvement of his equipment. A very cooperative attitude was displayed by the manufacturers and it is believed that the modifications incorporated as a result have materially improved the design and performance of their equipment. Data obtained on each instrument were made available to its manufacturer prior to issuance of the report so that an opportunity was presented for discussing the results. Comments of the manufacturers on the report submitted have been considered in preparation of the report in its final form.

As may readily be appreciated, the complete report consisting of 240 mimeographed pages forms a most complete contribution to the science of specific gravity measurement. Results of the work which has been done have been most stimulating and are believed to have had far-reaching effects in raising the standards of available equipment. Grateful acknowledgment is made to members of the staff of the National Bureau of Standards participating in these tests for the high quality of the work performed and as well as for its practical and scientific value. A debt of gratitude is also due Mr. Schmidt and his committee for envisioning the need for this study and for its successful supervision.

Compact Airplane Heater Has Postwar House Heating Possibilities

THE home of tomorrow may be heated by a gas "furnace" not much larger than an automobile muffler, tucked away in some nook of the house.

The new type heater was developed by Surface Combustion of Toledo, Ohio, for use in military airplanes. Designers discarded all previous concepts of ordinary heating principles to fill Army and Navy requirements for a heater which would give unfailing service in the thin air of high-altitude flying, or at rapidly increasing air pressure during a long dive or at any angle of flying.

The outcome of the development work by Surface Combustion, manufacturers of "Janitrol" heaters and a leader in the field of gas heating equipment for over 30 years, was the new "whirl flame" type heater, just two-thirds of a cubic foot in size in contrast to the 54¾ cubic feet of the conventional forced-air furnace for house heating. In weight, the comparison is approximately 30 pounds against the average 500 pounds of the conventional furnace.

Officials of the Washington Gas Light Company display National Security Award flag, conferred by the national Office of Civilian Defense in recognition of "maintenance of a superior standard of protection and security." From the left, H. B. Noyes, general superintendent; Everett J. Boothby, vice-president and general manager; J. R. McQueen, superintendent of production

Entire output of the "Janitrol" aircraft heater is going to manufacturers of aircraft and boats for the Army and Navy, but as soon as engineers are free to do so, they will turn their attention to adapting the principles incorporated in the unit for residential heating. Already, the revolutionary new heater has several potential uses other than in airplanes. Highway trucks, buses, trailers, streamlined trains and boats are a few of its possible applications. Its value in postwar cargo and transport planes has been demonstrated in today's warplanes. Building contractors can keep concrete at the right pouring temperature on cold-weather jobs with this heater made in portable form.

In the process of developing the aircraft heater, engineers used various fuels, including natural gas, and then adapted the unit to burn the high-octane gasoline of a plane. Low-octane gasoline and other liquid fuels are also suitable for the new unit.

The term "whirl flame" comes from the whirling action of the combusion air introduced into a cylindrical combustion tube. Liquid fuel enters the combustion tube through a vaporizer or spray nozzle ahead of the combustion air inlet. This vaporized or atomized fuel is mixed with the spinning column of the air, forming a long tapering core of enriched gases. This prolongs the combustion process for maximum efficiency.

The aircraft unit is made in four sizes with capacities ranging from 15,000 to 125,000 B.t.u. per hour with larger sizes under consideration. The largest size runs an hour on slightly more than a gallon of gasoline.

—Gas Newsweek

Accident Trends . . . *An Analysis of Gas Industry Personnel Experience in 1943*

THE Statistical Department of the American Gas Association has completed its annual survey of lost-time accidents occurring to employees of the gas industry. This survey is based on reports received from 416 gas companies and indicates a drop in both frequency and severity rates from those recorded in 1942. The reporting companies employed 93,650 persons who worked a total of 199,802,046 hours during 1943.

Because of a generally reduced and inexperienced personnel on the part of gas companies, and for other reasons, the 1943 survey is based on the experience of fewer companies than in the past. However, the 93,650 employees concerning whom we have collected data represent approximately 77 per cent of the employees of the industry and make it safe to assume that the trends herein discussed are representative of the industry as a whole.

STATISTICS analyzed in this article are taken from Statistical Bulletin No. 54, "Accident Experience in the Gas Industry for 1943," (collected in cooperation with the National Safety Council) which contains more extensive figures on the industry's accident record. Copies may be obtained from the American Gas Association.

By EDWARD R. MARTIN

Supervisor, Statistical Activities, American Gas Association

Lost Time Accidents (1943) Total Gas Industry

	Number of Lost-Time Accidents	*Days Charged*
Deaths and Permanent Total Disabilities	19	114,000
Permanent Partial Disabilities	69	38,775
Temporary	2,536	45,371
Total	2,624	198,146

The 2,624 injuries reported during 1943 indicate that there were 13.1 disabling injuries for each 1,000,000 hours of exposure. This represents a decrease of 5.8 per cent from the figure of 13.9 experienced in 1942. Putting it another way, there were 2.80 disabling injuries for each 100 employees, or 2.8 per cent less than the 1942 figure of 2.88.

Severity rates of the industry were based on 198,146 days lost or charged because of injuries. There were 0.99 days charged due to disabling injuries per 1,000 hours worked during 1943, or 18.2 per cent less than the 1.21 experienced in 1942. On the basis of days charged due to disabling injuries per 100 employees, this figure was 211.6 in 1943 and 250.6 in 1942, a decrease of 15.6 per cent.

There were 19 deaths or permanent total disabilities reported in 1943. This indicates a rate of .0203 fatal accidents per 100 employees, and is 27.5 per cent below the .0280 recorded in 1942.

Natural Gas Industry

No. of Reporting Companies	211
Daily Average No. of Employees	53,305
Total No. of Hrs. Worked— 1943	114,240,404

The natural gas industry established new records in 1943 by recording a frequency rate of 10.0 (Disabling injuries per 1,000,000 hours worked). This was 12.3 per cent less than the previous low of 11.4 experienced in 1942. This figure is equally as impressive when calculated on the number of disabling injuries per 100 employees which was 2.15 and 7.7 per cent below the 1942 record of 2.33.

Severity rates registered sharp declines when compared to the 1942 totals, and approached the previous low established in 1941. There were, in 1943, 0.80 days charged due to disabling injuries per 1000 hours worked, a decrease of 44.1 per cent from the 1942 rate of 1.43. Too, there were 171.1 days charged due to disabling injuries per 100 employees, or 41.2 per cent less than the 1942 rate of 291.0.

Manufactured Gas Industry

No. of Reporting Companies	205
Daily Average No. of Employees	40,345
Total No. of Hours Worked— 1943	85,561,642

Accident rates of the manufactured gas industry ranked among the highest ever recorded. The number of disabling injuries per 1,000,000 hours worked increased 4.8 per cent over the 1942 rate of 16.5 to 17.3 in 1943. This was highest frequency rate since 1930. There were 3.66 disabling injuries for each 100 employees, an increase of 5.5 per cent over the 3.47 for 1942, and the highest recorded since 1931.

Severity rates reached the highest point since 1932, and registered sharp increases over those experienced during the preceding year. There were, during 1943, 1.25 days charged due to disabling injuries for each 1000 hours worked, or 27.6 per cent higher than the 1942 rate of 0.98. The number of days charged due to disabling injuries per 100 employees

FIFTEEN YEAR SUMMARY OF ACCIDENT EXPERIENCE OF THE GAS INDUSTRY IN THE UNITED STATES

These data cover the entire operations of reporting gas companies and the operations of the gas department only for combination companies

Year	Number of Reporting Companies	Daily Average Number of Gas Employees	Total Number of Hours Worked by All Gas Employees	Number of Deaths and Permanent Total Disabilities	Total Number of Disabling Injuries (Lost Time Accidents)	Total Days Charged Due to Disabling Injuries (Lost Time Accidents)	Frequency Rates		Severity Rates		Number of Deaths and Permanent Total Disabilities per 100 Employees
							Number of Disabling Injuries per 1,000,000 Hours Worked	Number of Disabling Injuries per 100 Employees	Number of Days Charged Due to Disabling Injuries per 1,000 Hours Worked	Number of Days Charged Due to Disabling Injuries per 100 Employees	
					MANUFACTURED GAS INDUSTRY						
1929	249	58,941	144,920,217	15	4,743	172,864	32.7	8.05	1.19	293.3	.0254
1930	305	65,818	162,719,013	28	3,635	257,917	22.3	5.52	1.59	391.9	.0425
1931	310	64,669	158,812,393	20	2,642	177,704	16.6	4.09	1.12	274.8	.0309
1932	279	58,059	139,076,458	36	1,637	266,595	11.8	2.82	1.92	459.2	.0620
1933	312	62,792	140,081,313	11	1,597	102,798	11.6	2.59	0.73	163.7	.0175
1934	264	64,287	133,961,544	13	1,859	126,109	13.9	2.89	0.94	196.2	.0205
1935	252	64,013	134,353,240	14	1,610	134,663	12.0	2.52	1.00	210.4	.0219
1936	258	65,110	139,709,459	14	1,973	128,194	14.1	3.03	0.92	196.9	.0215
1937	268	63,079	132,819,388	13	1,687	114,108	12.7	2.67	0.86	180.9	.0206
1938	240	58,961	123,305,349	5	1,343	62,837	10.9	2.28	0.51	106.6	.0085
1939	230	59,950	124,357,504	8	1,512	81,290	12.2	2.52	0.65	135.6	.0133
1940	232	60,131	123,140,646	17	1,658	148,768	13.5	2.76	1.21	247.4	.0283
1941	240	55,500	111,947,007	13	1,569	115,977	14.0	2.83	1.04	209.0	.0234
1942	222	49,686	104,466,298	10	1,725	102,747	16.5	3.47	0.98	206.8	.0201
1943	205	40,345	85,561,642	10	1,478	106,939	17.3	3.66	1.25	265.1	.0248
					NATURAL GAS INDUSTRY						
1929	105	22,906	58,803,876	18	1,475	131,646	25.1	6.44	2.24	574.7	.0786
1930	144	43,042	109,371,457	25	2,166	217,748	19.8	5.03	1.99	506.0	.0589
1931	143	33,564	80,662,315	15	1,217	124,389	15.1	3.63	1.54	370.6	.0447
1932	164	36,292	87,559,012	14	1,053	115,848	12.0	2.90	1.32	319.2	.0386
1933	161	37,611	83,998,268	12	978	94,871	11.6	2.60	1.13	252.2	.0319
1934	158	42,874	87,767,782	9	1,401	97,755	16.0	3.27	1.11	228.0	.0210
1935	206	41,863	87,983,955	17	1,463	155,354	16.6	3.49	1.77	371.1	.0406
1936	199	44,968	95,115,326	16	1,643	160,184	17.3	3.65	1.68	356.2	.0356
1937	212	51,063	109,641,028	11	1,661	111,590	15.2	3.25	1.02	218.5	.0219
1938	206	53,686	112,913,953	18	1,482	160,277	13.1	2.76	1.42	298.5	.0335
1939	203	58,201	119,216,252	8	1,587	94,449	13.3	2.73	0.79	162.3	.0137
1940	217	61,198	125,879,064	19	1,771	167,668	14.1	2.89	1.33	274.0	.0310
1941	216	61,849	124,433,368	9.5	1,641.5	96,598	13.2	2.65	0.78	156.2	.0154
1942	217	54,014	110,262,199	19	1,258	157,172	11.4	2.33	1.43	291.0	.0352
1943	211	53,305	114,240,404	9	1,146	91,207	10.0	2.15	0.80	171.1	.0169

FIFTEEN YEAR SUMMARY OF ACCIDENT EXPERIENCE OF THE MANUFACTURED AND NATURAL GAS INDUSTRY IN THE UNITED STATES

These data cover the entire operations of reporting gas companies and the operations of the gas department only for combination companies

Year	Number of Reporting Companies	Number of Deaths and Permanent Total Disabilities	Total Number of Disabling Injuries (Lost Time Accidents)	Total Days Charged Due to Disabling Injuries (Lost Time Accidents)	Frequency Rates		Severity Rates		Number of Deaths and Permanent Total Disabilities per 100 Employees
					Number of Disabling Injuries per 1,000,000 Hours Worked	Number of Disabling Injuries per 100 Employees	Number of Days Charged Due to Disabling Injuries per 1000 Hours Worked	Number of Days Charged Due to Disabling Injuries per 100 Employees	
1929	354	33	6,218	304,510	30.5	7.60	1.49	372.0	.0403
1930	449	53	5,801	475,665	21.3	5.33	1.75	437.0	.0487
1931	453	35	3,859	302,093	16.1	3.93	1.26	307.5	.0356
1932	443	50	2,690	382,443	11.9	2.85	1.69	405.3	.0530
1933	473	23	2,575	197,669	11.5	2.56	0.88	196.9	.0229
1934	422	22	3,260	223,864	14.7	3.04	1.01	208.9	.0205
1935	458	31	3,073	290,017	13.8	2.90	1.30	273.9	.0293
1936	457	30	3,616	288,378	15.4	3.28	1.23	262.0	.0273
1937	480	24	3,348	225,698	13.8	2.93	0.93	197.7	.0212
1938	446	23	2,825	223,114	12.0	2.51	0.94	198.1	.0204
1939	433	16	3,099	175,739	12.7	2.62	0.72	148.7	.0135
1940	449	36	3,429	316,436	13.8	2.83	1.27	260.8	.0297
1941	456	22.5	3,210.5	212,575	13.6	2.74	0.90	181.1	.0192
1942	439	29	2,983	259,919	13.9	2.88	1.21	250.6	.0280
1943	416	19	2,624	198,146	13.1	2.80	0.99	211.6	.0203

totalled 265.1 in 1943, or 28.2 per cent greater than the 1942 rate of 206.8.

At the present time the Statistical Department is preparing the 1943 edition of its annual "Review of Fatal Injuries in the Gas Industry" for the Association's Accident Prevention Committee. The aim of this study is to distribute first hand information on specific cases and thereby contribute towards preventing the recurrence of such accidents.

Comments on Rates for Gas Space Heating

IMPORTANT activities of the A. G. A. Rate Committee include investigation and discussion of required rate levels and appropriate rate design. This interesting discussion of residential rates, particularly rates for space-heating, was originally prepared by Mr. Masser for the information of the Rate Committee. Its thought-provoking approach to a problem facing practically all gas companies warrants this wider presentation of it.

—E. N. STRAIT, Chairman,
A. G. A. Rate Committee.

By H. L. MASSER

Executive Vice-President, Southern California Gas Co., Los Angeles, Calif. Member, A. G. A. Rate Committee

DOUBTLESS one of the important questions now before many utility executives is the matter of "inducement" rate forms which will best promote and facilitate the maximum profitable sales of gas fuel. It appears that there cannot be any single plan or formula which will solve this because of the great diversity of the many influencing factors encountered in various parts of the country.

The idea in studying new rate forms presupposes there may be forms better than those which we now have. Perhaps with many companies this is true. However, generally there are limitations immediately confronting us in establishing new rates. Usually there is the necessity that the new rates be lower than existing rates, even in the top blocks, although the over-all effect of a new schedule might produce less revenue from an existing customer group; in other words, there are but few instances where rates can be increased. One of the outstanding motives is to reduce, where possible, certain existing rates and thereby obtain a volume of new business, even at a relatively and comparatively low rate per unit, but which will result in increased net earnings after all charges upon the invested capital.

The opportunity for this latter goal may potentially exist in large degree with some companies, while with others it may be almost nonexistent. Certain "manufactured" gas companies in the colder climates, with relatively high rates, and with thoroughly adequate production and distribution facilities, are not presently supplying much of the house heating load, and also in many cases they have a relatively low saturation of automatic water heaters. In these cases there exists the potential desirability for lowered rates for water and house heating.

While the writer's experience fails to qualify him to judge cases of this nature, nevertheless, the impression is often conveyed in some of our publications that the house heating load can be obtained for manufactured gas at profitable rates. On the other hand, we have all encountered sufficient experience to know that usually gas fuel is more expensive than coal in nearly all Eastern areas, and, further, that there is a definite limitation to the cost differential which the average consumer can afford to pay for the convenience and desirability of gas house heating.

The extent of the price differential in annual dollars will depend upon the magnitude of the heating load, which in turn is dependent upon mean temperatures, length of heating season, size and type of building construction. The limitation of cost differential is primarily dependent upon income and the availability of other fuels. Unquestionably, it is necessary, in order to secure and retain sizable volumes of new house heating load, that the rate for gas be sufficiently low so that the true cost differential as actually experienced by the customer will not be more than he feels he is willing to pay for the benefits of gas fuel. Undue optimism with respect to gaining this class of business should be avoided.

Areas Classified

In studying rate situations in generalities, it might be appropriate to classify areas according to local conditions:

1. Manufactured gas service in cold climate areas.
2. Manufactured gas service in areas of moderate climate.
3. Natural gas service in cold climate areas.
4. Natural gas service in areas of moderate climate.

Under the first classification above, the annual cost differential between gas and coal will be greatest, thereby requiring a particularly low gas rate per therm. Using the very rough index on an arbitrary decimal basis of $10 per ton coal of 10,000 B.t.u. per lb. requires a corresponding price of 25¢ per M cu.ft. for 500 B.t.u. gas. Unless this price can be reasonably approached, the annual cost differential will be the determining factor. Assuming that the existing top blocks of rate schedules presently provide only sufficient net revenue for a fair return, then it must be possible to establish bottom blocks which yield a small increment of return (either directly or by spreading general costs) at a low price approaching 25¢ per M cu.ft. The possibilities of this vary with each company. The form of the rate schedule depends upon whether or not the heating gas is supplied through the present meter or a new separate meter; this will doubtless depend upon the magnitude of the individual heating loads and the percentage of total customers supplied with house heating (again a determination for the individual company).

In principal, but to a lesser degree, the same questions come into play with respect to manufactured gas service (where therm costs are relatively high) in areas of moderate climatic conditions. Natural gas service in severe climates also encounters this same question of annual fuel cost differential because of the competitive coal price in most of such areas.

The writer's experience in Southern California has been confined to the service of high B.t.u. gas in an area of very mild climatic conditions, where the lowest mean daily winter temperatures never drop below 40° and the annual degree days average 1,350 with an annual customers' usage of about 56,000 cu.ft. of 1,100 B.t.u. natural gas and serving presently 850,000 customers. From 1915 to 1927 mixed natural and manufactured gas of 850 B.t.u. was served, and since the latter date, straight natural gas.

Rapid Growth of Gas Use

There has been a very rapid growth in the number of customers in the Los Angeles area and the unit consumption has increased progressively because of the fact that gas is virtually the universal fuel. About 92% of the homes use gas for cooking and 94% have gas water heaters. On the other side, about 6% use electric cooking and 5% electric water heating. Of our gas customers, about 85-90% have gas water heaters, mostly automatic thermo-storage, and about 95% of the customers use gas for space heating. All domestic service is supplied through a single meter and under a general service schedule of: a minimum charge of 80¢ for the first 300 cu.ft.; next 1,800 cu.ft. @ 5.8¢ per 100 cu.ft.; next 1,900 cu.ft. @ 5.2¢ per 100 cu.ft.; all over 4,000 cu.ft. @ 5.0¢ per 100 cu.ft. Presently we have a space heating rate. We have about 1.5% of customers, such as small offices, etc., that use gas for heating only, and for this service we have a rate of: 300 cu.ft. @ 80¢; next 1,800 cu.ft. @ 6.8¢ per 100 cu.ft., next 1,900 cu.ft. @ 5.8¢ per 100 cu.ft.; over 4,000 cu.ft. @ 5.0¢ per 100 cu.ft. for such service, but this is discouraged by the engineers of our state regulatory commission. In addition to the service of domestic and commercial customers, a large industrial load is also carried, which for the combined services produces a potential demand of approximately 500,000 M cu.ft. per day during winter peaks. Of necessity, much of this industrial load is curtailed as required

in favor of domestic customers. The peak day domestic, commercial and firm load reaches about 425,000 M cu.ft. with maximum hours of 30,000 M cu.ft., while summer lows drop to about 100,000 M cu.ft. per day.

With the situation of gas being the universal space heating fuel, as well as carrying by far the preponderance of the cooking and water heating load, we are not presently confronted seriously with the necessity of special form inducement rates to obtain new business. In the future we may have a serious problem with respect to electric competition for cooking and water heating, not primarily because of the relative costs of the energy, but more because of competitive salesmanship and customers' ideas regarding the appliances.

The competitive situation from energy cost standpoint, here and in other areas where governmentally developed hydro-electric power is available (and particularly with surplus capacity after the war), is certain to become more acute. Gas rate reductions, with possibly some inducement forms, may require serious consideration. However, as our competition will be essentially confined to the cooking and water heating load, rate schedule changes would influence the top blocks rather than the bottom blocks of the schedule.

Looking to Future

While gas utility executives are presently endeavoring to plan rate forms for future requirements, we must not lose sight of the fact that in many localities unit consumption and probably total consumption may appreciably reduce in the postwar period with corresponding increases in unit production and other costs. It is easy to reduce rates but quite a different question to increase any rates; therefore, we should not be hasty to offer lower inducement rates, merely *hoping* to gain new business.

It is typical of companies in natural gas areas (constituting about 45% of the total customers of the country) to supply much of the heating load; this develops extreme peaks and usually for very short durations with poor load factors and therefore this heating gas is the most costly to serve. The form of rate under which increased usage above certain points costs higher rates, fails to control the load problem and is not generally equitable to all customers. Likewise, demand limiting devices are not a good answer to the domestic peak load problem, for in this class of service, the gas utility should endeavor to place itself in a position of adequately supplying all of such customers which it holds itself out to serve.

It is the writer's opinion that, for natural gas areas, where much heating load is supplied, the domestic rate schedule should not have a great number of blocks, but the last block should start about where the normal heating load begins and should then run out level because increased consumption cannot be served at lesser cost.

For domestic service in dealing with the rank and file of individual customers, an easily understood form of schedule is highly desirable; this argues against the use of the multi-part form of rate actually set forth in the schedule. It is extremely difficult and laborious to accurately and equitably predetermine demands for a great number of domestic customers, thus making such a rate rather undesirable. Aside from varying demand, commodity and average fixed charge increments can readily be computed into a single charge per consumption unit, and these can be averaged into blocks of appropriate size and thus produce the simple form of block schedule.

A. G. A. Meritorious Service Award

THIS award is the gas industry's official recognition of the gas company employee who has performed the most meritorious act during the year. It is awarded by the Executive Board to the individual who has shown meritorious and conspicuous judgment, intelligence or bravery in saving human life either in the plant or works of any gas undertaking or having to do with the handling of the materials of manufacture or of the products manufactured or distributed. Such individual is eligible who at the time of the occurrence was in the employ of a natural gas company, manufactured gas company, or manufacturer company member of the American Gas Association.

Since its establishment, the award, supported by an endowment in memory of Walter R. Addicks, consisted of a beautiful gold medal, button and certificate. Last year, wartime restrictions on the use of gold necessitated an award of the cash equivalent. Although these conditions may again prevail, it need hardly be emphasized that the award bestows a greatly coveted distinction.

To qualify, the deed must have been performed during the period beginning July 1, 1943 and ending June 30, 1944. Forms for the application will be furnished upon request of Association Headquarters, and when properly filled should be sent in on or before August 1, 1944.

New National Advertising

PLANS of the gas industry's national advertising program for 1944-45 will be described in a promotion piece which is scheduled to be distributed to the gas industry on or about June 15. This new campaign was approved at a meeting of the Committee on National Advertising held at French Lick, Indiana, May 9.

Servel Holds Gas Air Conditioning Schools

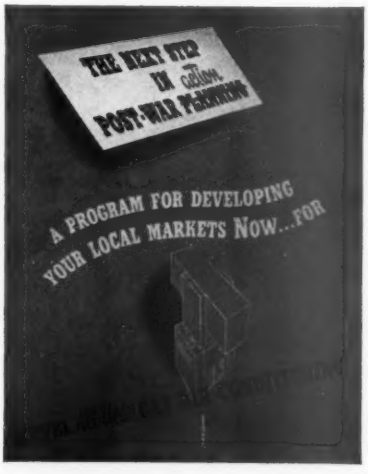
DURING the month of April gas air conditioning schools were held in the field in five western states by J. K. Knighton, manager of gas air conditioning sales for Servel Inc., and John Gilbreath, assistant sales manager of gas air conditioning, with a total attendance of 233 people.

The nine schools were held in Denver, Colo.; Salt Lake City, Utah; Portland, Ore.; Concord, Sacramento, Fresno, Los Angeles, and San Diego, Calif.; and Phoenix, Ariz.

During the past three months Servel's gas air conditioning department has been holding these meetings all over the United States, and they have been attended by a total of 1,631 men from gas utility companies.

Due to interest on the part of the gas industry, further week-long application, service, and sales engineering schools will be held at the factory in Evansville, Ind., during the month of June. The schedule of the schools in June included June 5-10, application engineering school; June 12-15, service engineering school; and June 19-23, sales engineering school.

Air Conditioning Planbook



Sales promotional planbook on the Servel All-Year Gas Air Conditioner entitled, "The Next Step in Post War Action," was recently released to cooperating gas utility companies. The new planbook, covering all wartime phases of preparation for postwar action on the air conditioner, was sent to more than 300 gas utility companies. The book covers such points as third party contacts and how to make them; building of acceptance among commercial prospects; preselling the ultimate domestic consumer; and building postwar interest by using publicity and advertising media

Personal AND OTHERWISE

Elected President of Cities Service

S. B. Irelan

S. B. IRELAN, elected president of the Cities Service Gas Company at Bartlesville, Oklahoma, on April 17, 1944, has been connected with Cities Service in various capacities for the past 35 years.

Upon graduation from the engineering department of Purdue University in 1909, he went to Denver, Colorado, and enrolled in the cadet engineering training school of the Denver Gas and Electric Company.

He has occupied many positions with the Cities Service Company and its subsidiaries since his connection with the organization, having been vice-president and general manager of the Bartlesville Gas, Electric & St. Ry. Company, Bartlesville; The City Light & Traction Company, Sedalia, Missouri, The Montgomery Light and Water Power Company, Montgomery, Alabama, and the St. Joseph Ry., Lt., Ht. & Power Company, St. Joseph, Mo. At the time of his election as president of the Cities Service Gas Company, he was serving as vice-president of Electric Advisers, Inc. in charge of original costs, rates, and valuation studies.

New York Utility Names Lyons

RALPH D. JENNISON, president of New York State Electric & Gas Corporation, May 15 announced the appointment, effective June 1, of William A. Lyons as assistant to the president of that corporation with offices in Binghamton, New York.

For the past fifteen years Mr. Lyons has been connected with the Associated Gas and Electric System in various financial, accounting and management capacities. Since October 1, 1941, he has been comptroller of NY PA NJ Utilities Company, the parent company of New York State Electric & Gas Corporation, from which position he is resigning. Mr. Lyons has been on loan to the War Production Board as chief of the Fuel and Allocations Branch, Office of War Utilities, since September 1942. He resigned his position with the War Production Board on April 30.

Prior to coming with the Associated System in 1929, Mr. Lyons was employed in the accounting department of Consolidated Edison Company of New York for five years.

Miss Dillon Accorded New Honor

Mary E. Dillon

ANOTHER "first" was added to the long list of honors accorded Miss Mary E. Dillon, president of the Brooklyn Borough Gas Company, on May 9 when she was elected president of the New York City Board of Education. The first woman to hold this post, she also enjoys the distinction of being the first woman head of a large public utility corporation.

Her stature is indicated by the fact that the *New York Times* Magazine section, May 21, carried a two-page feature article giving her background and achievements under the title "An Alger Career—The Story of Mary Dillon." After charting her phenomenal rise to business heights, the article says in part:

"She was always abreast, or a little ahead, of other corporations in the industry. Her fame spread wherever public utilities operate, and where efficiency is honored. Miss Dillon, nevertheless, has found time to work on dozens of committees, to help organize civilian emergency bodies when war started, to help with the blood bank, to share in all civic enterprises, to run her own home, etc. . . . . In 1935, when Mrs. Franklin D. Roosevelt named eleven women who have inspired her, Mary Dillon's name was near the top of the list. The late Ida Tarbell chose her as one of America's great women. In 1942, the Brooklyn Chamber of Commerce chose her for the award for 'the outstanding citizen of the year' in that borough."

Miss Dillon has been active in the business, civic and charitable life of Brooklyn for many years. She is a director and past vice-president of the Brooklyn Chamber of Commerce; a member of the Brooklyn advisory board of the City Planning Commission and of the Mayor's Business Advisory committee. Her other interests include a directorship in the Brooklyn Chapter of the Red Cross; a member of the Brooklyn Defense Recreation Committee and the executive committee of the New York Defense Recreation Committee.

The gas industry is honored by the recognition accorded its outstanding woman executive.

Re-elected to Board of U. S. Chamber

T. J. Strickler

T. J. STRICKLER, vice-president and general manager, Kansas City Gas Company, has been unanimously re-elected to the Board of Directors of the Chamber of Commerce of the United States.

This is the sixth 2-year term that Major Strickler has represented the seventh election district on the board. The seventh district includes Missouri, Kansas, Arkansas, Oklahoma, Texas, and Louisiana.

In addition to his many activities with the Chamber of Commerce of the United States, he has been active in the American Gas Association. He is a past president of the Association, has served as chairman of the Natural Gas Department, and, in addition, was chairman of the National Advertising Committee for a number of years. He has also served on numerous other committees of the Association.

Major Strickler has long been active in local civic affairs. He is president of the Kansas City War Chest, and is serving for his third year. He also served two years as general chairman for the Community Chest in addition to heading many other civic organizations during the past several years.

Major Higgins Named Deputy Commander

NEW deputy commanding officer of the 21st Ferrying Group, Air Transport Command at Army Air Base, Palm Springs, Calif., is Major Albert E. Higgins, widely known gas man. In peacetime, Major Higgins is vice-president of Pittsburgh Equitable Meter Co., Pittsburgh, Pa. For some years, he was secretary of the Natural Gas Department of the American Gas Association.

Miss Sweeney Advanced

Elizabeth Sweeney

OTIS L. WIESE, editor-in-chief, and Camille Davied, executive editor, announce that the Food and Household Equipment Editorial Departments of "McCall's Magazine" have been merged to insure closer integration of the related subjects of food and household equipment. To head the combined departments, Miss Elizabeth Sweeney has been appointed director of foods and household equipment.

For the past year Miss Sweeney has been serving as household equipment editor of "McCall's." Prior to this she was assistant professor of foods and nutrition, College of Home Economics, Syracuse University. Before that she was assistant professor of household technology at Syracuse.

Before joining the staff of Syracuse University, Miss Sweeney was for a number of years director of home service for the Central New York properties of the Associated Gas & Electric System. She is a past chairman of the Home Service Committee of the American Gas Association.

Searing Promoted

HUDSON R. SEARING, formerly vice-president in charge of electric and gas production and operations, Consolidated Edison Co. of New York, has been elected executive vice-president of the company.

Sullivan Awarded McCarter Medal

EDWARD E. SULLIVAN, meter tester and installer employed by the Northampton Gas Light Co., Northampton, Mass., was recently awarded a McCarter medal for life-saving. The presentation was made by E. G. Twohey, vice-president and manager of the company, at a meeting of all company employees.

The award to Mr. Sullivan was made as result of his action in saving the life of a local man on Oct. 14, 1943. While passing in a company truck, he was hailed and told that a nearby resident had been accidentally overcome by gas. Through his prompt application of the prone pressure method of resuscitation, he succeeded in reviving the man.

The McCarter medal is awarded by the American Gas Association for the successful application of the Schafer prone pressure method of resuscitation.

Luke C. Bradley Dies

LUKE C. BRADLEY, former New York utility executive, died May 12 at his home in Lafayette, Ind. He was 69 years of age.

Before his retirement four years ago, Mr. Bradley had served as president of Consolidated Electric and Gas Co. and vice-president of Stone & Webster Service Corp., both of New York City. He organized utilities for the latter firm in nearly every state and in the Philippines and Argentina. He spent seven years in Buenos Aires as vice-president of the American Foreign Power Company.

Alfred M. Ogle Dies

ALFRED M. OGLE, president, Indiana Gas and Chemical Corp., and Terra Haute Gas Corp., died May 6 at the age of 61.

In 1935, Mr. Ogle reorganized the Indiana Consumers Gas and By-Products Co. as the Indiana Gas and Chemical Co. He was the first president of the Indiana Western Gas Company.

George H. Boyd Dies

GEORGE H. BOYD, manager of the service inspection and records department of the Consolidated Edison Co. of New York since 1938, died April 15. He was 55 years of age.

Mr. Boyd joined Consolidated Edison as a draftsman in 1911, later serving as superintendent in the gas distribution department. He was a member of the Society of Gas Engineers and the Gas and Electric Association, and a governor of the former Gas Company Mutual Aid Society.

San Diego Utility Executive Dies

H. R. Peckham

SAN DIEGO lost one of its outstanding public utility executives and engineers in the sudden death last month of Hildreth R. Peckham, vice-president in charge of operation of the San Diego Gas and Electric Company.

Mr. Peckham joined the staff of the San Diego utility in 1912, serving successively as engineer, department superintendent, general superintendent and vice-president. In his final position he had charge of all construction work and the operation of the company's gas and electric plants and distributing systems.

CONVENTION CALENDAR

1944

JUNE

June 6-7 **American Gas Association Joint Production and Chemical Committee Conference**
Hotel Pennsylvania, New York, N. Y.

6-8 **Southwestern Gas Measurement Short Course**
University of Oklahoma, Norman, Okla.

6-8 **Public Utilities Advertising Association**
Palmer House, Chicago, Ill.

8 **Canadian Gas Association 37th Annual Convention**
Royal Connaught Hotel, Hamilton, Ontario

8 **American Management Association Annual Meeting**
Hotel Pennsylvania, New York, N. Y.

8-9 **Midwest Industrial Gas Sales Council Spring Meeting**
Peoria, Ill.

9 **Natural Gas and Petroleum Association of Canada, Annual Meeting**
Niagara Falls, Ontario

16 **New York-New Jersey Regional Gas Sales Conference**
New York, N. Y.

16 **Mid-West Gas Association, Sectional Meeting**
Hotel Lowry, St. Paul, Minn.

19 **A. G. A.-A. G. A. E. M. Food Service Gas Equipment Conference**
New York, N. Y.

19-22 **American Society of Mechanical Engineers**
Pittsburgh, Pa.

19-23 **American Home Economics Association Annual Meeting**
Hotel Stevens, Chicago, Ill.

27 **American Gas Association Conference on the Operation of Public Utility Motor Vehicles**
Hotel Bellevue-Stratford, Philadelphia, Pa.

OCTOBER

Oct. 3-5 **National Safety Congress**
Sherman, Morrison & LaSalle Hotels, Chicago, Ill.

AFFILIATED ASSOCIATION *Activities*

Manufacturers Hold Annual Meeting

Lyle C. Harvey

LYLE C. HARVEY, president, The Bryant Heater Co., Cleveland, Ohio, was elected president of the Association of Gas Appliance and Equipment Manufacturers at the 1944 annual meeting of that organization, held May 8 and 9 at the Palmer House, Chicago. Some 200 members and guests took part in the conference which accented postwar gas appliance improvements and sales methods.

Other officers elected at this meeting are: first vice-president—D. P. O'Keefe, president, O'Keefe & Merritt Co., Los Angeles; second vice-president—John A. Robertshaw, president, Robertshaw Thermostat Co., Youngwood, Pa.; treasurer—John Van Norden, secretary and manager, sales promotion, American Meter Co., New York.

Col. Willard F. Rockwell, retiring president of the Association, presided and presented a brief review of the year's highlights. Mr. Van Norden, reporting as treasurer, expressed gratification with the Association's membership which now totals 241 active members, compared with a prewar peak of 270.

A strong appeal for expanded national advertising and promotion was made by Ernest R. Acker, president, American Gas Association, and president, Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y., who declared that such a program was essential to postwar industry progress. He also urged the manufacturers to study bulletins issued by the A. G. A. laboratories and to apply the results of A. G. A. research to their postwar models.

Speaking on "Teamwork," Major Alexander Forward, managing director, A. G. A. said that continued coordination between appliance manufacturers and gas utilities is a postwar "must." He noted the great backlog of demand built up in America and praised the industry's postwar plans and research aimed to capture this market.

Everett J. Boothby, vice-president and general manager, Washington Gas Light Co., reporting as chairman of the A. G. A. Domestic Gas Research Committee, gave a valuable review of the current research program.

A timely presentation on the Coordinated Gas Kitchen Program was made by C. V. Sorenson, Northern Indiana Public Service Co., Hammond, director of that activity. He reported coordinated work under way with manufacturers of kitchen cabinets, floor coverings, glass and other materials.

Frank H. Adams, vice-president and general manager, Surface Combustion, Toledo, Ohio, chairman, A.G.A.E.M. Postwar Planning Committee, praised the A. G. A. postwar work and urged manufacturers to translate the Association's recommendations into action.

Divisional meetings occupied the entire afternoon, followed by the annual dinner, at which Elmer Wheeler, Dallas, Tex., was the principal speaker.

At the Tuesday morning meeting, Henry H. Morse, vice-president, Florence Stove Co., Gardner, Mass. and chairman, Industry Publicity Committee, recommended continuation of price control with fundamental changes to allow business to operate without hampering restrictions.

Urges Research Utilization

H. Leigh Whitelaw, managing director, A.G.A.E.M., supported previous speakers who urged greater utilization of A. G. A. research and more manufacturer research. He declared that the A. G. A. national appliance survey, covering 82 per cent of the gas meters in the country, is the only such study known to have been made by any industry, and it reveals strong support for higher quality appliances. Mr. Whitelaw also reported that demands for improvement in appliances are evolutionary, not revolutionary; and that utilities are generally agreed on a policy of fewer models.

Other speakers at this session were John Darr, vice-president, The Institute of Public Relations, New York, N. Y., and Frank B. Boice, Shell Oil Co., N. Y. Mr. Boice disputed reports that postwar demands of the chemical industry would reduce the amount of liquefied petroleum gas available for household uses. He attributed shortages developing regionally last winter to transportation difficulties.

Following a group luncheon, Tuesday afternoon was again occupied with meetings of various divisions of the Association. New chairmen of these divisions were elected as follows:

Chairman, CP Sales Management Committee; L. C. Ginn, American Stove Company, Cleveland, Ohio

Chairman, Direct Heating Equipment Division; H. E. Thompson, Chief Engineer, Peerless Manufacturing Corp., Louisville, Ky.

Chairman, Domestic Gas Range Division; F. J. Hoenigmann, Cribben & Sexton Co., Chicago, Ill.

Chairman, Gas Refrigerator Division; Louis Ruthenburg, President, Servel Inc., Evansville, Ind.

Chairman, Gas Valve Division; R. L. O'Brien, Detroit Brass & Malleable Works, Detroit, Michigan

Chairman, Gas Water Heater Division; J. R. Lavelle, John Wood Mfg. Co., Conshohocken, Pa.

Chairman, Hotel, Restaurant & Commercial Gas Equipment Division; Stanley E. Little, Vice-President, American Stove Company, Cleveland, Ohio

Chairman, House Heating and Air Conditioning Equipment Division; A. A. Marks, Richmond Radiator Co., Uniontown, Pa.

Chairman, Industrial Gas Equipment Division; E. W. Mears, Mears-Kane-Ofeldt, Philadelphia, Pa.

Chairman, Meter & Regulator Division; Norton McKean, President, American Meter Company, Albany, New York

Chairman, Thermostatic Control & Accessories Division; W. T. Bentley, President, Titan Valve and Mfg. Co., Cleveland, Ohio

Chairman, Advisory Council; F. H. Adams, Surface Combustion Division, Toledo, Ohio

Chairman, Policy Committee; W. T. Rasch, Security Manufacturing Company, Kansas City, Mo.

Chairman, P.C.G.A. Manufacturers Section; A. H. Sutton, President, Mission Water Heater Co., Los Angeles, Calif.

Vice Chairman, P.C.G.A. Manufacturers Section; E. T. Howard, Gen. Sales Mgr., General Controls Co., Glendale, California

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Maryland Utilities Elects New Officers

WILLIAM B. BENNETT, Capital Transit Co., Washington, D. C., was elected president of the Maryland Utilities Association at the recent annual meeting of the Association. Henry S. Davis, Conowingo Power Co., Elkton, Md., was named vice-president; J. Carl Fisher, Consolidated Gas, Electric Light & Power Co. of Baltimore, was designated treasurer, and Raymond C. Brehaut, Washington Gas Light Co., Washington, D. C. was chosen as secretary.

Supplers Celebrate Seventh Birthday

Head table at the seventh birthday dinner of the Gild of Ancient Supplers, held May 1 at the Benjamin Franklin Hotel, Philadelphia. Left to right: Joe A. Mulcare, senior warden; C. E. Bartlett, mayor; Joseph A. Messenger, alderman; J. H. Moore, clerk; Arnold E. Peterson, former New York warden; and William S. Guitteau, first and immediate past mayor

Wisconsin Utilities New Officers

S. B. SHERMAN, Racine, vice-president and general manager of the Wisconsin Gas & Electric Co., was unanimously elected by mail ballot as president of the Wisconsin Utilities Association, succeeding John G. Felton, La Crosse. Mr. Felton becomes chairman of the Association's Advisory Committee.

M. H. Montross, Wausau, vice-president, Wisconsin Public Service Corp., was elected vice-president. Alfred Gruhl, Milwaukee, assistant research engineer, Wisconsin Electric Power Co., was elected treasurer, succeeding D. W. Faber, Milwaukee.

The new officers started their terms with the beginning of the Association's fiscal year on May 1.

President-elect Sherman is an Honorary Veteran member of the Wisconsin Utilities Association. He has been chairman of the Gas Section and numerous committees.

Indiana Gas Men Hold Annual Meeting

MEMBERS of the Indiana Gas Association heard many of the gas industry's leaders at the thirty-fourth annual meeting of that organization held at the Hotel Lincoln, Indianapolis, Indiana. A varied program, covering war contributions, and postwar sales, servicing and advertising policies, was presented under the chairmanship of Guy T. Henry, Central Indiana Gas Co., Muncie, president of the Association.

Clarence W. Goris, Northern Indiana Public Service Co., Gary, was elected president for the 1944-45 term. Herman G. Horstman, Public Service Co. of Indiana, Indianapolis, was named vice-president, and Paul A. McLeod, Public Service Co. of Indiana, Newcastle, was re-elected secretary-treasurer.

Representing the American Gas Association on the program were Major Alexander Forward, managing director; A. M. Beebee, chairman, Postwar Planning Committee; and Wallace M. Chamberlain, chairman, Domestic Gas Range Committee.

Pennsylvania Gas Annual Meeting

C. K. Steinmetz

CHARLES K. STEINMETZ, Pennsylvania Power and Light Co., Carlisle, was elected president of the Pennsylvania Gas Association at the thirty-sixth annual meeting of the association held May 2 at the Benjamin Franklin Hotel, Philadelphia. Other new officers were selected as follows: first vice-president—Louis C. Smith, Harrisburg Gas Co.; second vice-president—C. B. Melton, Chambersburg Gas Co.; third vice-president—Frank H. Trembly, Jr., The Philadelphia Gas Works Co.; secretary—William Naile, Lebanon Valley Gas Co. (re-elected); and treasurer—James A. Schultz, Consumers Gas Co., Reading.

Members of the council elected at this meeting consist of Andrew J. Leib, Hazelton; James J. Moffatt, Pittston; Bernard V. Pfeiffer, Philadelphia; Carl A. Schlegel, Philadelphia; and O. E. Benson, Easton.

Theme of the meeting, which attracted more than 300 delegates, was the gas industry's postwar position. In addition to the association's president, W. G. B. Woodring, Allentown Bethlehem Gas Co., principal speakers included: Ernest R. Acker, president, American Gas Association; Major Alexander Forward, managing director, A. G. A.; R. D. Calkins, dean, School of Business, Columbia University; Hudson W. Reed, president, The Philadelphia Gas Works Co.; H. Carl Wolf, president, Atlanta Gas Light Co.; and Edmund Collins, Jr.

Metropolitan Council Elects Officers

AT the last meeting of the Metropolitan Heating and Air Conditioning Council, held Wednesday, May 17, at A. G. A. headquarters, the following officers were elected to serve for the ensuing year: Chairman—William J. Schmidt, Long Island Lighting Company, Mineola, New York; Vice-Chairman—J. J. Wholey, Rockland Gas Company, Spring Valley, New York; Secretary-Treasurer—Robert Lawder, Consolidated Edison Company of New York.

It was decided to hold a summer conference at Union, New Jersey, and the date was tentatively selected as Friday, July 28. Manufacturer's representatives are to be invited to attend.

The formal program May 17 consisted of a discussion of the various methods employed to make house heating surveys and cost estimates. This discussion was led by Edward Gerridge of The Brooklyn Union Gas Company and proved to be of such interest that it was decided to appoint a committee consisting of three members with Mr. Gerridge as Chairman to study the various methods of estimating used by member companies. The purpose is to devise a uniform method of surveying and estimating which may be adopted by the Council.

A vote of thanks was given to the retiring officers.

—JAMES COOK

Mid-West Gas Plans Sectional Meetings

FOUR sectional meetings are being arranged by the Mid-West Gas Association, according to an announcement by R. B. Searing, secretary-treasurer of the Association. The first meeting will be held June 16 at the Hotel Lowry, St. Paul, Minn.; subsequent meetings will take place at Omaha, Neb., in September; Minneapolis, Minn., in November; and Des Moines, Iowa, in February, 1945.

The St. Paul meeting will open with a general session at 10:00 A.M., June 16, and will include separate luncheons at noon; one for operating men, and another for sales and accounting men, to be followed by separate discussion meetings in the afternoon. The committee in charge will be Ralph H. Meserve, Northern States Power Co., St. Paul, and George B. Johnson, Minneapolis Gas Light Company.

Accounting SECTION

Accountants Discuss Multitude of Problems at Annual Spring Conference

TACKLING a multitude of wartime accounting, operating and personnel problems, approximately 600 gas and electric industry accountants from all parts of the United States and Canada took part in the Annual Spring Conference held April 25-27 in Cleveland, Ohio. While the main theme of the conference revolved around the war emergency, there was also considerable discussion of postwar factors.

The capacity attendance and enthusiastic participation in all discussions indicates the intense interest in the topics presented. Within the framework of one General Session, a General Luncheon and a series of separate group meetings, the conference program ranged the gauntlet of an imposing array of subjects Attention at the General Session centered on personnel matters but virtually all phases of accounting work were touched in some degree at the group meetings.

The entire afternoon of April 25 was devoted to the General Session program presided over by O. H. Ritenour, Washington Gas Light Company, Washington, D. C., and F. B. Flahive, Columbia Gas and Electric Corporation, New York, N. Y. Mr. Ritenour opened the session with a few remarks and accepted the "key to the city" extended by W. R. Pringle, assistant to the president, The East Ohio Gas Company, who was pinch hitting for J. French Robinson, president of the company, who was unable to be present.

Collective Bargaining Topic

The first program speaker, Gerald D. Lukeman, Prentice-Hall Inc., New York, presented a non-technical review of what employers should know about Wage and Salary Stabilization. He was followed by R. C. Simpson, Gilbert Associates, New York, who spoke on "Postwar Developments in Collective Bargaining." Mr. Simpson gave an interesting account of the specific objectives of labor relating to utility companies and warned the utility men that it was time to do some serious thinking on this subject.

Whiting Williams, industrial consultant, Cleveland, speaking on "Personnel Relations," said that fear is uppermost in most workers' minds. "Everyone of them fears that when the war is ended he will have no job." He urged most employers to take immediate steps to meet this situation.

C. W. Kellogg, president, Edison Electric Institute, then presented a brief paper on "Historical Facts on Depreciation" which embodied a statement of depreciation principles. The General Session closed with a valuable talk on "Recent Developments in Utility Regulation" by Dr. H. B. Dorau of New York University. Pointing out that accounting is well on the way toward becoming the almost single and exclusive implement of the regulatory process he stated that few accountants are aware of the ultimate import of the creeping revolution of regulation in their industry.

General Activities Group

The General Activities Group met on Wednesday morning under the joint chairmanship of L. V. Watkins, Panhandle Eastern Pipe Line Co., Chicago, and H. H. Scaff, Ebasco Services Inc., New York. This session covered a number of timely subjects and proved to be one of the most productive of the conference.

The initial report at this meeting was made by H. C. Hasbrouck of New York, chairman of the A. G. A. Committee on Depreciation Accounting. Mr. Hasbrouck brought the delegates up-to-date on the most significant developments since the last Joint Conference affecting treatment of depreciation in the accounts of gas utilities.

The subject of "Employee Manuals" was presented in two parts—Otto Price, Boston Consolidated Gas Co., covered procedure manuals and R. L. Lagerquist, The Connecticut Light and Power Company, Waterbury, discussed employee information bulletins. In discussing the former, Mr. Price said that standard practice instructions serve as an important management control as well as being useful in training new employees. "Substantial savings both in time and money have resulted from the revision of existing routines in connection with the use of standard practice instructions," he said. He presented a suggested routine for the preparation of such instructions and also outlined those used currently by the Boston company.

Before describing the contents of a typical employees' handbook, Mr. Lagerquist pointed out that "the rapid growth of labor organizations, plus Federal and State legislative action has tended to summarize the relationship between employer and employee." He indicated that a manual outlining the policies which covered this relationship would help to effect a complete understanding between employer and employee, both organized and unorganized, which he called "essential if industry is to be conducted without friction and interruption."

C. E. Packman, Middle West Service Co., Chicago, made a valuable contribution on the subject of "The Depreciated Original Cost Rate Base." Presentations were also made of papers on "Pension Plans in the Utility Industry," by Phillip E. Benjamin, Towers, Perrin, Forster & Crosby, Inc., Philadelphia; "Renegotiation" by C. A. Eastman, Ebasco Services Inc., New York; and "Five-Year Amortization in Rate-Making" by L. P. Spacek, Arthur Anderson & Co., Chicago.

Under this group the General Accounting Committee held meetings on Wednesday afternoon and Thursday morning under the chairmanship of L. E. Reynolds, The Connecticut Light & Power Company, Hartford, Conn., and J. E. Jackson, The Cleveland Electric Illuminating Company, Cleveland. The activities were confined on both days to a panel discussion, a complete innovation being that the panel members were not confined to accounting personnel. Timely topics such as "Wage and Salary Stabilization," "Pension Plans," "Employee Relation Problems," "Functional Accounting," etc. were discussed.

Panel members who so ably discussed the many questions included: Fred Rauch, The Cincinnati Gas and Electric Company, Cincinnati, Ohio; Richard C. Simpson, Gilbert Associates, New York; Roland S. Child, Central Hudson Gas and Electric Company, Poughkeepsie, New York; T. S. Lever, The Philadelphia Gas Works Co., S. M. Smallpage, New Orleans Public Service Inc.; Frank Meuhlheuser, Public Service Electric and Gas Company, Newark,

PROCEEDINGS

Proceedings of the meeting of Electric and Gas Industry Accountants, Cleveland, April 25-27, will be available soon. A copy will be mailed to each person who attended the Meeting. Others who are interested may secure them from Headquarters Office at $2.00 per copy.

N. J.; and Fred Pickford, Hartford Gas Co., Hartford, Conn.

Following the panel discussion, reports of the subcommittees on "Reports to Regulatory Authorities" and "Protection and Preservation of Records" were presented by E. K. Higley, Middle West Service Co., Chicago, and S. E. Campbell, Natural Gas Pipeline Co., Chicago, the respective chairmen. This discussion also included remarks by D. E. Cohn, United States Bureau of the Budget, Washington, D. C., and W. T. Neel, Philadelphia Electric Company, on the former subject.

Customer Activities Group

The Customer Activities Group, under the chairmanship of J. J. Natale, Philadelphia Electric Co. and H. R. Flanegan of the same company, met on Wednesday morning and continued in the afternoon of the same day. Individual committee meetings under this group held informal conferences on Thursday morning. Mr. Natale opened the Wednesday morning session with a few remarks on "Review and Outlook."

"Lessons from Wartime Billing Plans" was presented by A. J. Mayotte, Consumers Power Co., Jackson, Michigan, with a discussion following under the leadership of W. A. Kelly, Consolidated Gas, Electric Light and Power Co. of Baltimore. J. E. Glines, Michigan Consolidated Gas Co., Detroit, spoke on "Employee Training Programs—Wartime and After," followed by a discussion led by M. D. Read, Minneapolis Gas Light Company, and E. T. Colton, New Orleans Public Service Inc.

The keynote of a paper presented by E. L. Ramsey, The Laclede Gas Light Co., St. Louis, Missouri, on "The Work of the Customer Relations Man Today" was the proper handling of personnel problems. In connection with wartime service he cautioned the utility men to bear in mind that the public's memory of contacts tactlessly handled will persist after the war and may have adverse effects on opinion generally toward utilities.

Claude S. Hazel, The Philadelphia Gas Works Co., presented a paper that caused much discussion not only at the Wednesday meeting but also at subsequent sessions of the Customer Relations Group, having to do with installation and servicing, customer appliances, and piping beyond the meter. Mr. Hazel, who is chairman of the Customer Relations Committee of the Pennsylvania Gas Association, urged his audience to be alert to the possibilities of this type of contracts and their negative and positive effects. He described service practices which had to be abandoned or curtailed or in some cases now charged for that heretofore had been given free, all of which affects Customer Relations.

Wallace G. Murfit, chairman, A. G. A. Customer Relations Committee, concluded the session with a report on "Customer Problems in Wartime and After." Asserting that there is no more important problem for utility executives to consider today than that of Customer Relations, he said that the gas industry, in fact all industry, had been remarkably successful in developing physical objects and services but that all had failed to coordinate people. He claimed that personnel dissensions were evidence of this and that if, after the war, social and political approval was to be accorded to the utilities the surest way to obtain it was by fostering proper customer relations through the development of intelligent and loyal personnel. His committee favors retraining of employees, not only in contact technique but also in familiarity with appliances and even with company policies, practices, rates and finances.

On Wednesday afternoon at a continuation of the Customer Activities Group meeting a "Customer Collections Forum" was held. Mr. Flanegan opened with remarks on "Customer Relations and Employee Relations." There followed a presentation of papers on "Maintaining Favorable Customer Paying Habits" by C. W. Tobey, The East Ohio Gas Co., Cleveland; "Coding for Collection Follow-up" by H. S. Hahn, The Ohio Fuel Gas Co., Columbus; and "Bill Forms and Reforms" by R. F. McGlone, The East Ohio Gas Co.

The remainder of the meeting was devoted to a panel discussion of current and postwar problems, with Mr. Natale acting as chairman and the following eight men participating: H. E. Cliff, Public Service Electric & Gas Co., Newark, N. J.; R. E. Guild, Indianapolis Power & Light Co.; W. R. Keagy, The Cincinnati Gas & Electric Co.; L. A. Mayo, The Connecticut Light & Power Co., Hartford; F. W. Phelps, Union Electric Co. of Missouri, St. Louis; J. H. W. Roper, Washington Gas Light Co.; F. E. Smith, Boston Edison Co. Among the subjects discussed were "The Future of Present Emergency Practices," "Employment Problems," "Uniformity in Utility Billing," "Maintaining Employee Morale During Wartime," "Lengthened Work Schedules," and "Training Supervisors."

The Customer Relations Committee met for informal round-table discussion on Thursday morning. Harry Jeffs, Queens Borough Gas and Electric Company, and Wallace G. Murfit, The Philadelphia Gas Works Company, presided.

Mr. Hazel went into further detail on the importance of the customers' serviceman; that is the man doing physical work on the customer's premises and cultivating good customer relations. He described what practices are now wholly or partially abolished and which ones are now charged for, which previously were done free.

G. A. Saas, of Indianapolis, presented a picture wherein the opposite policy is followed, under the theory that opportunity was now presented to utilities to cement public friendship to themselves by extending service and make old appliances work efficiently.

The question of postcard billing was thoroughly discussed and means whereby it could be adopted and delinquent charges placed on the postcard explained in full by representatives from companies in the Pittsburgh area where the practice has been in effect for some time.

Also discussed was the subject of reading of meters by customers and sending in marked postals. A conclusion was reached that no more than two successive readings should be accepted before the meter is actually read by a company representative.

The Customer Collections Committee under H. S. Hahn, The Ohio Fuel Gas Co., and K. E. Boyle, The Dayton Power & Light Co., agreed to undertake a broad and rather complete survey of industry policies and practices regarding credits and collections. The committee believes such a survey would provide useful information on current trends and methods and also an accurate means of pointing the way toward plans for consideration of postwar practices. It was decided that the analysis and tabulation of the survey should be completed and compiled for distribution at the A. G. A. Annual Meeting.

Unusually interesting discussions covering the more urgent problems during the present emergency and for the immediate postwar period took place in the meeting of the Customer Accounting Committee headed by H. J. Johnson, Michigan Consolidated Gas Company, Detroit, and J. A. Williams, Niagara Hudson Power Corp., Syracuse. It was decided to make a thorough study covering all phases of bimonthly reading and billing for presentation at the Fall conference. J. H. Roper, Washington Gas Light Co., submitted a report covering proposed changes in merchandise billing and bookkeeping methods, a study of which will be continued and a more complete report made at the fall conference. Considerable discussion was had regarding the various meter reading methods and variation in billing methods. It was the consensus that any billing method involving the estimating of consumption will be abolished after the present emergency.

Space does not permit a description of a number of other related subjects which were also discussed. Of particular interest, however, was an article by F. L. J. Hammerle, Central New York Power Corporation, Syracuse, on "Recharging and Reuse of Flashlight Dry Cell Batteries."

Plant Accounting and Records Group

The Plant Accounting and Records Group under the chairmanship of A. M. Hartogensis, Ebasco Services Inc., New York, and H. P. Taylor, Wisconsin Public Service Corp., Milwaukee, met on Wednesday afternoon and again on Thursday morning, filling the meeting room to capacity at both sessions. These sessions were devoted to lively, informal, off-the-record discussions of a list of topics including: current accounting problems related to construction, continuing property records, amortization of acquisition adjustment accounts, recent cases involving original cost,

acquisition adjustment accounts and plant adjustment accounts, and contributions in aid of construction on extensions subject to abandonment after the war.

There was considerable discussion of construction overheads, particularly of the problems encountered at the present time when a substantial amount of expense is incurred for obtaining priorities, while construction is at a low volume. Although the consensus favored the practice of capitalizing expenses in connection with construction priorities, it was pointed out that a restudy of overhead costs might indicate that personnel which previously devoted much time to construction engineering and supervision were currently devoting a greater portion of their time to operating problems, resulting in reasonable overhead rates during this period and a correct allocation of costs.

In some of the recent cases involving original cost, acquisition adjustments, and plant adjustments, it was felt that some utilities had not presented the strongest possible case. The importance of very careful preparation of future cases and more searching cross-examination of commission expert witnesses was expressed.

In many cases, contributions received in connection with the extension of service to war industries and government facilities will be required to absorb a part of the retirement loss which will be incurred if the extension is abandoned at the termination of the war.

Materials and Supplies Group

The Materials and Supplies Group met Wednesday afternoon and Thursday morning under the chairmanship of E. S. Brock, Public Service Electric & Gas Co., Newark, and T. W. Ayton, Indianapolis Power and Light Co., Indiapanolis. Papers were presented on the following subjects: Salvage in Public Utilities, Stock Control, Wartime Automotive Fleet Maintenance, Mechanical Stores Accounting, Changes in Purchasing Procedure—Postwar Period, Recent Amendments to U-1 Regulations Affecting Reporting Procedures, Disposal of Surplus Materials and Equipment, Stores Expenses.

The papers and other subjects presented were well received and discussed at considerable length.

Taxation Accounting

H. D. Heiby, Columbia Engineering Corp., New York and J. V. Sealy, Philadelphia Electric Co., were the presiding chairmen at the meetings of the taxation accountants on Wednesday afternoon and Thursday morning, which meetings were, as usual, on the order of a round-table discussion. The number of attendants was probably the greatest to date and the interest shown was amply evidenced by the large number who actively participated in the discussion of various subjects. Special attention was given to such subjects as "Assembling Tax Data"; "Pension Funds"; "Section 722"; "Intangible Drilling Costs"; "New Tax Legislation Affecting Public Utility Corporations" and "Amortization of Account 100.5." In addition to these, other subjects were brought up for discussion, among which "Methods of Interim Tax Accruals" elicited possibly the greatest amount of interest and discussion.

Among the suggestions developed at the meeting were the following:

(a.) In order to get the benefit of the maximum unused excess profits credit carryover, taxpayers who produce or transport natural gas should make the excess output calculation on their returns (Form 1121) even though the return shows no tax liability.

(b.) Oil or gas operators having intangible drilling and development costs who wish to exercise the option of deducting such costs as expense on their tax returns must express that intention in the return for the first taxable year beginning after December 31, 1942 in which such costs were incurred. In case no such costs were incurred in 1943 it might help the taxpayer to avoid overlooking this requirement if some sort of statement were included in the 1943 return. (Such statement would not satisfy the terms necessary to the election, but would merely help remind the taxpayer to make the necessary election at the proper time.)

(c.) Taxpayers in position to benefit by both the excess-output feature and the amortization of war facilities feature of the Internal Revenue Code should weigh the possible long-term advantage of foregoing the amortization deduction. The situation in question arises from the fact that the amortization, if availed of, would lower the "unit net income" and thereby lower the advantage otherwise available through Section 735.

A general luncheon meeting on Thursday ended the formal program, at which a special address was given by Colonel Wilward F. Rockwell, chairman of the board, Pittsburgh Equitable Meter Co., and Timken-Detroit Axle Co., Detroit, on "Free Enterprise."

Following the luncheon, informal meetings of the respective committees were held to discuss and plan for future activities.

Ritenour a Director

O. H. RITENOUR, comptroller, Washington Gas Light Co., and chairman, Accounting Section, American Gas Association, was elected a director of The Maryland Utilities Association at the annual meeting of that organization held April 21 in Baltimore.

Conover Advanced

GEORGE R. CONOVER was elected vice-president in charge of personnel and public relations of the Philadelphia Electric Company, at a meeting of the board of directors held April 25. The announcement was made by the president of the company, Horace P. Liversidge.

Keeping the Flame Up

(From *Advertising Age*, April 17, 1944)

SERVEL is worth watching, but definitely. The company gives every indication of knowing which way the wind is blowing, and what to do about it. For example, it has just distributed a little booklet, "The Magic Flame" to stockholders and employees. The booklet tells the story of the postwar all-year air conditioning system which Servel announced a few months ago —it tells what the product is, the plan of action which is being followed in its introduction, and its potentialities—all neatly translated into the personal interests of stockholders and employees. Listen to this:

"When peace returns, we want to be able to re-employ every man who left Servel to enter the armed services . . . . keep veteran employees . . . . and provide jobs for many of the new workers who are helping us fulfill our war contracts. And to do this, we must not only be ready to resume the manufacture of prewar appliances, but also have new products to make and sell.

"The Servel all-year gas air conditioner will help provide new postwar jobs at Servel, and new sales, installation and engineering jobs for returning soldiers and sailors in communities all over the country."

Lever Elected Treasurer

THOMAS S. LEVER, JR., controller, The Philadelphia Gas Works Company, Philadelphia, Pa., has been elected treasurer of the Philadelphia Control of the Controllers Institute of America for the fiscal year 1944-1945.

Censor at Work

THERE is one compelling slogan that even the British censor couldn't bear to see mutilated. It is "Gas Halves Work and Doubles Comfort," promulgated by The Great Grimsby Gas Company in England.

In opening a letter addressed to the American Gas Association, the censor inadvertently tore off part of the envelope carrying the word "Gas" from the slogan. However, in resealing the envelope, he meticulously pasted a slip of paper over the torn part and rewrote the word—thus completing the slogan.

You never know where you'll find a gas man these days.

Adolph Mueller Dies

ADOLPH MUELLER, chairman of the board of Mueller Company, manufacturer of gas products, died May 14 after a brief illness. He was active in his company until the last and also retained all of his interests in outside organizations.

Protect the value of the money you earn. Buy War Bonds.

Postwar Gas Appliance Design from the Servicing Viewpoint

While the following report was presented at the twenty-first annual Distribution Conference of the Technical Section, held April 18 and 19 at Cleveland, Ohio, servicing gas appliances is so closely related to postwar residential gas sales that is is felt worthwhile to call Mr. Steen's timely suggestions to the attention of members of the Residential Gas Section.

By D. M. STEEN

Queens Borough Gas & Electric Co., Far Rockaway, N. Y.

MARK TWAIN once said, "Everybody talks about the weather but nobody does anything about it!" Currently everybody is talking "Postwar Planning" but, unlike Mark Twain's contemporaries, we know that something is being done about it. Therefore, at this time, before postwar gas appliance design becomes too far developed, it is most opportune to discuss gas appliances from the servicing viewpoint.

At present we can only discuss the postwar appliance from the viewpoint of our experience with past and present-day equipment. Some of these appliances are almost Utopian. Unfortunately, others are hardly this. It is felt that an approach for the purpose of suggesting corrections to appliances not meeting with the approval of servicing organizations might be made by comparative analysis.

Lack of Accessibility

That such a program is pertinent is evidenced by the thousands of dollars which are being spent by gas companies for phases of servicing which should and could have been avoided. The reasons for this are manifold, but perhaps we should begin with "lack of accessibility" as one of paramount importance. Let us take a concrete example: a factual not hypothetical case. Out our way two residences are equipped with winter air conditioners. Each conditioner is considered quality equipment. To clean the heat exchangers in the first house, major dismantling must be effected. It takes two solid hours to disassemble and reassemble the job. But it only takes ten minutes to do the work actually needed.

Thus we find ten minutes in useful work and two hours to be charged to inaccessibility. The house next door is different. Here two access doors are provided. A twist of the wrist opens a door and the serviceman is ready for his useful work. There are no screws, bolts, gaskets, nor furnace cement. Two hours may appear inconsequential, but when multiplied by each similar experience, it becomes, in fact, very important. Inaccessibility does not rear its ugly head on heat exchangers or boiler sections only. It applies to a wide variety of component parts such as burners, pilots, pilot safety assemblies, motors, fans, filters; in fact on certain parts which require both emergency and periodical inspection and service. It applies with equal emphasis on certain domestic appliances.

Inaccessibility might be due to the fact that some engineers of design are unified in a direction of increased efficiency, modern design, or any numbers of reasons, and do not give sufficient thought to the service problem in the field. It might be lack of interest because servicing seldom devolves upon the manufacturer. Whatever is the cause does not alter the effect. The effect is wasteful expenditure of time. Time is money. The sober facts are that we are in this business to produce a fair return upon investment. Money spent in servicing which could have been avoided reflects unfavorably upon this objective.

And how does a serviceman react to such things? Scoffers will say he doesn't care. He gets paid an hourly stipend and he doesn't care what he does just as long as he puts in a day's work which he can justify! This is not our experience. A serviceman feels, and we agree, that he is a "Doctor of appliances." When he has to service an appliance which involves dismantling, he places himself in the same position as a surgeon who must do all the janitorial work in the operating room before performing an emergency operation.

Just a few words on durability. In those reckless "1920's" water heaters were sold with one- or two-year tank guarantees. These guarantees were indeed very conservative. The past few years have seen a general development of extravagant warranties. Ironically, many of these one- and two-year guaranteed jobs stood the test of time for upwards of fifteen years, whereas some present-day tanks fail in less than one year.

This is not a general condemnation of present-day heaters. There are some types which are excellent and no tank trouble at all has developed. However, the premature demise of many both ferrous and non-ferrous tanks should be given primary consideration in postwar water heater development; not solely because we have been put to tank changing costs reaching alarming proportions, but from the negative promotional effect this produces on water heating as a load builder. Time does not permit any detailed exposition on pilots. However, it should be mentioned that we have found that a heavy stainless steel type has proved best of all materials.

Reliability

Let's turn to reliability. By this we mean maximum periods of appliance operation without need for adjustment or other service. In short, the customer's use of an appliance without periodical interruption due to failure of some mechanical device. Safety pilot controls are a source of service calls. There is a seemingly endless variety of these devices. In the past there was a need for individual consideration on the part of a manufacturer to develop his own product. We believe this era is ended. For postwar we would like to see greater standardization of this very important control.

We have found universal acceptance and enthusiasm expressed for the thermo-couple type. This is not to be construed that we are in favor of throttling research or further development. We are mindful of the advantages of electric ignition and the practicability of some forms of bi-metallic application. However, we frankly ask Mr. Manufacturer of Postwar equipment this question:—"Do you intend to use your own type when the record shows that 'Specialists' have developed a better one?" We know that "salesmanship" or "expressing individuality" can be the reason for the choice; not cost as we are sometimes told.

Some manufacturers abhor being classified as producing an "assembled" appliance. However, we have found that a lot of so-called "assembled" appliances, where the manufacturer concentrates on matters other than "controls," are in fact least troublesome from a servicing standpoint. And don't let us lose sight of the fact that when an appliance gives better performance in the field there is maximum customer satisfaction which produces a wider general acceptance to the unsold market.

Small orifice stoppages are the reasons for far too many service calls. While the responsibility for rust, dust, or gum lies with the utility, the manufacturer of appliances should recognize this evil and plan to do his share in helping us overcome this problem. Installation of filters is meeting with increasing favor in the manufactured gas areas. In postwar appliance assembly the manufacturer should make provision for the installation of a filter. Whether the filter itself is provided by the manufacturer is of secondary importance to the need for arrangement of pilotage, or other small orifice devices, which will permit the use of a filter when it is found to be desirable.

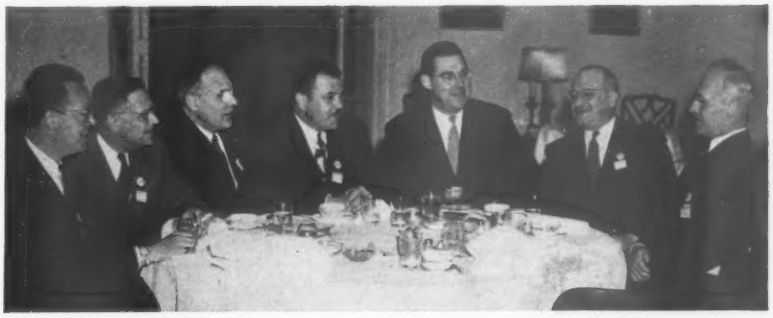
Trial and error of past and present construction, design, and types of all controls and accessories are being very carefully analyzed by those who are held responsible for appliance operation and servicing costs. These analyses are being made with a view towards making recommendations which should eliminate those features which are known to be a detriment to the best interests of customer, utility, and the manufacturer.

It is interesting as well as gratifying to report that many manufacturers are thinking along these same lines. We have had visits and lengthy discussions with appliance manufacturers recently and they heartily welcome our constructive criticisms and suggestions.

These all too brief remarks express not only my own views but represent the expressed opinions and viewpoints of the membership of the Metropolitan Service Managers' Council. This membership embodies a majority of metropolitan New York companies having a combined meterage of several millions.

Gas companies are not interested in increased consumption for sendout alone. It is logical that increased consumption must be profitable consumption. This is the basic reason why RELIABILITY, DURABILITY, and SERVICEABILITY must be the watchwords of postwar appliance design. If the manufacturer will firmly adhere to these principles our objectives will be accomplished. This accomplishment will permit considerable savings in servicing expenditures or have an equal effect of allowing us to care for greater numbers of appliances without added cost. These savings could well be applied to more extensive promotional efforts and result in more sales of the manufacturers' products as well as increased profitable revenue for ourselves.

Furniture Industry Makes Postwar Plans



Special luncheon sponsored by the A. G. A. Residential Gas Section for executives of the National Retail Furniture Association. Left to right: F. W. Williams, American Gas Association; Dr. Albert Haring, economist and consultant to NRFA; Loren D. Troost, president, National Retail Furniture Association; M. M. Freeman, secretary, NRFA Postwar Planning Committee; J. A. Milligan, National Furniture Review; Wm. P. Sheidy, Kaufmann Furniture Co.; Roscoe R. Rau, executive vice-president, NRFA. Attending the luncheon but not photographed was Jack Hand, editorial director, National Furniture Review

A LARGE and representative group of furniture executives gathered at the Claridge Hotel, Atlantic City, N. J., on May 1 and 2 to attend the War Problems Conference sponsored by the National Retail Furniture Association.

The two-day meeting was featured by a series of important and informative addresses and discussions on subjects relating to the current and postwar activities of the furniture industry.

Included among the roster of distinguished and nationally known figures was Congressman Mike Monroney, a member of the House Committee on Banking and Currency, who discussed "Retail Price Control —Retrospect and Prospect." Other speakers and topics were Dr. Delbert Duncan, Professor of Marketing, Northwestern University, NRFA Economist-Consultant, "Effectiveness, Necessity, and Adequacy of Price Control"; Dr. Albert Haring, Professor of Marketing, Indiana University, NRFA Economist-Consultant, "Streamlining Regulation W for the Duration" and Stanley B. Adams, Director of Consumer Durable Goods Division, War Production Board, "The Trend of Production Controls and Their Influence on Home Goods."

Senator Alben W. Barkley of Kentucky, Majority Leader in the U. S. Senate, delivered a stirring dinner address on the subject of "Government Policies for a Sane Postwar Distribution Era."

The meeting was attended by governmental representatives of the WPB, the OPA, members of the press, and representatives of the gas and electric industries.

A special luncheon sponsored by the A. G. A. Residential Gas Section was held for the executives of the National Retail Furniture Association at which time the subject of greater cooperation between the furniture and gas industries in the postwar era was discussed.

Milwaukee Views Appliance Outlook

Prominent gas utility executives among the 150 heads of gas appliance firms who were guests of the Milwaukee Gas Light Company at a dinner meeting at the Astor Hotel, March 28. Arranged by Henry Dropp, sales manager of the company, the speakers at the meeting gave a down-to-earth picture of postwar gas appliance prospects. Shown here are, left to right: Bruno Rahn, president, Milwaukee Gas Light Co.; Louis Ruthenburg, president, Servel Inc.; B. T. Franck, vice-president, Milwaukee Gas Light Co.; John A. Fry, president, Detroit-Michigan Stove Co.; H. L. Ashworth, Wisconsin Appliance Association; and H. F. Herwig, secretary, Wisconsin Utilities Association

An explanation of the various types of jars and closures used in wartime food preservation is given by the home service department on the sales floor of the Michigan Consolidated Gas Company at Grand Rapids. At right a consumer is receiving an explanation of steps in canning, a much appreciated service given by the home service department at the Grand Rapids Canning Center

"You canned them, now use them" is a theme that home service people are playing up in their displays and demonstrations. With the plentiful supply of food this last winter, much of the material canned in 1943 has not been used. To avoid carrying it over the summer and to have jars to use for this year's crop, Mrs. Lillian Dunbar of the Cambridge Gas Light Company has set up a floor display in various company offices to show the variety of uses that can be made of the home canned foods

CP Promotional Budget Upped 150% for Next Six Months

MORE than $5,000,000 has been spent in the past three years in national magazine and newspaper advertising to promote postwar sales of gas appliances, Lloyd C. Ginn, chairman of the CP Gas Range Manufacturers Executive Committee, announced at the CP Manufacturers Annual Meeting in Chicago on May 9. Of this amount, $4,000,000 was spent by manufacturers and gas utilities to promote the CP gas range. At the same time, Mr. Ginn announced a 150 per cent increase in CP manufacturers advertising and promotional budget for the last six months of 1944.

Increases in the CP promotional budget were made to allow wider coverage of architects and builders, furniture, hardware, department store and the other appliance dealers who sold 2,300,000 gas ranges valued at approximately $140,000,000 in 1942.

By handling gas ranges built to CP specifications, dealers will be able to meet price competition with a quality product that has ready consumer acceptance and to capitalize on the growing emphasis on grade labeling and the increasing consumer demand for higher quality products built to recognized uniform standards Mr. Ginn pointed out.

With the exception of the I.E.S. Lamps, the CP gas range is the only program in which manufacturers within an industry have set up product specifications among themselves according to Mr. Ginn. Success of the CP program is indicated by the average increase to $70 in unit sales price of all gas ranges from 1939 to 1942 and the 140 per cent increase in oven heat-controlled gas ranges.

Because of the increasing demand for material in the CP Business Building Plan and the large number of requests from dealers for the Kit describing the plan, the present program will be continued and augmented during the balance of the year. Theme of the CP Business Building Plan is making jobs for 10,000,000 service men by placing orders now for postwar delivery.

Tappan Portfolio

AN elaborate 1944 portfolio of the Tappan Stove Company is now in the hands of the firm's representatives for presentation to dealers and prospects. Twenty-four pages of text and illustration tell the Tappan story—the history of the company's advertising; reprints of current national magazine advertising, the sales training and kitchen planning programs and the research now being done anticipating postwar ranges.

Mention is made of Tappan wartime products, including a wide line from wing tank covers, and auxiliary gasoline tanks, to galleys and hot food storage equipment for the Army and Navy Air Forces.

Don't let temptation loosen your purse strings. Put all you can in War Bonds.

Industrial & Commercial Gas SECTION

CHARLES G YOUNG, *Chairman*
HARRY K WRENCH, *Vice-Chairman*
EUGENE D MILENER, *Secretary*

Rebuilding the Industrial and Commercial Gas Sales Personnel

By F. B. JONES

General Sales Manager, Equitable Gas Company, Pittsburgh, Pa.

F. B. Jones

POSSIBLY, if the title of this talk had read, "Re-establishing the Effectiveness of Industrial and Commercial Sales Personnel," it might fit more closely the remarks I have to make. The use of the word "rebuilding" in the program naturally implies that something has been torn down or been lost.

To check on the size of the rebuilding job in industrial and commercial sales manpower that will exist for the postwar period, I sent out a personnel inventory sheet about two months ago to a representative group of natural and manufactured gas companies. This personnel inventory requested the companies to furnish the status of their industrial and commercial personnel as of January 1, 1941 and as of February 15, 1944—covering a period of approximately three years. Replies from companies representing about 22% of the industry's meters were received. Most of the remarks in this paper are based on the data obtained from this inquiry, supplemented by statistical data from other sources.

Decline in Personnel

On the average, in both natural gas and manufactured gas companies the decline in the numbers of sales personnel in these fields has been about 35% for this 3-year period—not as large a loss as I had anticipated. One disturbing feature of these findings was that most of this decline has occurred in the commercial field. In the commercial activities alone, personnel losses ranged from 10% to 100%—averaging about 50%. The overall 35% personnel loss, as compared with the loss in the number of personnel formerly active in the residential and merchandising field, would indicate that the job of recruiting new industrial and commercial sales personnel is a relatively simple one (numerically) as compared with a like job in the residential activities.

Presented at American Gas Association War Conference on Industrial and Commercial Gas, Rochester, N. Y., March 30 and 31, 1944.

As might be expected, the average age of the remaining industrial and commercial representatives has risen during the past three years. The inventory showed that the average age increased about three times faster than time passed. Obviously, the younger men were lost to the armed services and war industries. You may be interested in knowing that the average age is now about 45-plus years. It now varies from a low of 38 to 52.

Another quite significant fact brought out by this personnel study was that in peacetime, as represented by January 1, 1941, both natural and manufactured gas companies showed widely varying relationships between the number of industrial and commercial sales personnel on the payroll and the individual company's revenue obtained from the industrial and commercial fields.

This conclusion is reached by matching the data on personnel strength obtained from the representative list of companies with the MCF sales and revenue from the industrial and commercial fields during the years 1941 and 1943. Allowing for the factors of different rates, nature of territories served, and types of markets served, there seems to be a justifiable conclusion that there are wide differences on the part of individual companies in their degrees of cultivating and protecting the industrial and commercial markets.

There were evidences of some companies having 3 times as much sales manpower in these fields prewar as other companies. This contrast cannot be explained away by saying that some companies had relatively few salesmen for large total annual sales at low rates or had a non-competitive market, because this contrast existed with companies serving the same type of gas at approximately the same rates to approximately the same type of market.

Of course, we realize that the principle of "diminishing returns" would soon begin to operate in this field if an individual company attempted to add too many salesmen. However, considering the amounts of revenue involved, there was very little evidence that any of the companies studied had approached the point where it had too many salesmen for the amount of revenue obtained from these markets.

Postwar Need for Sales Manpower

Having discovered that the actual decline in the numbers of existing industrial and commercial sales personnel, particularly in the industrial field, has not been disastrously severe up to this time, and also having discovered that most companies apparently had failed to develop maximum opportunities from these fields in former peacetime days, let's turn to a consideration of the future. Will it be sufficient merely to re-establish the prewar industrial and commercial personnel strength? Will postwar conditions require more and better quality of industrial and commercial sales personnel? Will the economics of the gas business encourage increased activity to not only hold existing industrial and commercial revenues at the end of the war, but to increase them over the prewar levels?

I think the answers to this last question, to a large degree, have already been indicated to you by E. N. Strait in his very excellent paper on the "Value of Industrial and Commercial Gas Load to Utilities." If I properly interpret Mr. Strait's remarks as applied to a typical natural gas company, or a manufactured gas company for that matter, it is going to be more necessary in the postwar period than ever before for all gas companies, insofar as their markets will permit, to endeavor to maintain as much of their industrial and commercial sales as possible and increase them wherever opportunity affords. I should add, perhaps, that rates in these fields must be properly developed, as Mr. Strait indicates, to furnish a reasonable profit margin. Then, it appears that a substantial industrial and commercial revenue at fully profitable rates may be the economic key to competition in the residential field. Because with such rates and industrial and commercial revenue, more competitive residential rates can be made or maintained. The gas company, depending for its future largely on revenue from the residential field, will evidently have a tough battle.

Moreover, most companies, in the postwar period, will have a gas system already rather fully developed, at least in certain

areas. This condition will represent many millions of dollars in investment, which probably cannot be profitably and economically employed in serving the residential market alone. When the war load drops off, many gas companies will have excess capacity in all or some parts of their systems. In such situations, it can probably be shown that maintenance and development of a substantial industrial and commercial load is essential to the financial well-being of such companies, in both the natural and manufactured gas fields. Even those companies (both manufactured and natural) who are merely interested in maintaining the volume of industrial sales at the level to which they will shrink immediately after the close of the war will probably find it necessary to do a much more effective job of protecting their loads against competition in order to maintain such a status quo.

All of these factors added together seem to justify the prediction that postwar industrial and commercial sales manpower not only must be rebuilt and its effectiveness reestablished, but also must be increased because of one or all of the following reasons.

1. To replace wartime losses.
2. To make it possible to effectively defend postwar industrial and commercial load against competition.
3. To make it possible to take advantage of the new postwar industries or improved processes resulting from many research developments and progress during the war in the manufacture of many old and new articles.
4. To correct the deficiencies in the number of personnel in these fields that existed in the prewar period.

Increasing Personnel Effectiveness

The objective of improving the effectiveness of industrial and commercial sales personnel, as already indicated, cannot be reached by merely increasing the number of salesmen assigned to this field, but equal emphasis must be put on the effort to increase the quality of the personnel effort in these markets. I have already touched on the prewar circumstance that the small numbers of personnel in these fields required customer contact to be spread so thin that only superficial sales attention was given to most customers or, as sometimes happened, a few of the more active customers received most of the sales contacts. Many promising prospects and good customers were left unprotected against the inroads of competition.

The blame for this prewar contact situation cannot be laid entirely at the door of industrial and commercial sales managers. In most instances it must be shared by the management of the companies involved who, for one reason or another, were unaware of the need or desirability of fully protecting and developing these markets.

Does any one question the fairness of this charge against gas company managements in general? If so, then consider the unsuccessful struggle the Industrial and Commercial Section has had in trying to raise the proportion of A. G. A. National Advertising funds from a flat percentage of 10% to a more nearly equitable arrangement, considering that the overall revenue from these non-residential markets, prewar, represented about 36% of total gas revenues.

It may be unwise or too simple to suggest a yardstick for determining the size of the industrial and commercial sales force based upon dollars of gross annual revenue. We do know, however, that the ratio between the number of salesmen and the number of residential customers has received considerable attention for years by sales managers interested in the residential field. More recently the "Market and Economic Research Committee" of the A. G. A. Postwar Planning Committee has made a thorough study of this relationship in the residential market for manufactured gas companies. They indicate best results are obtained when a company employs one residential representative for anywhere from 1,500 to 3,000 meters. Or expressed another way, one residential representative should be used, at least, for each $93,000 of gross residential revenue, figured on the basis of 3,000 meters averaging $31 gross revenue per year per meter (national average for manufactured gas companies in 1941).

Inspection of the data collected in the personnel inventory related to the prewar revenue of the companies involved indicated that the 1941 relationships between annual revenues and sales manpower for both natural and manufactured gas companies are as expressed in the following table.

NATURAL GAS COMPANIES—1941

	High	*Low*	*Estimated Average*
Commercial Revenue per Salesman/yr.	$ 500,000	$170,000	$400,000
Industrial Revenue per Salesman/yr.	$1,200,000	$425,000	$600,000

MANUFACTURED GAS COMPANIES—1941

	High	*Low*	*Estimated Average*
Commercial Revenue per Salesman/yr.	$ 675,000	$180,000	$375,000
Industrial Revenue per Salesman/yr.	$ 425,000	$100,000	$200,000

Of course, we realize that there will always be ample justification for wide variations in the number of sales representatives employed, compared with the total revenues in various markets obtained by different companies. Competitive factors, types of gas sold, market saturations, and many other things will influence these ratios. However, study of the data from this analysis seems to justify the statement that the sales coverage of industrial and commercial markets in most companies has been, prewar, considerably under-manned, in relation to the residential market. Perhaps the foregoing comments on the sales manpower to annual revenue relationship should be further qualified by saying that they are not offered as an infallible yardstick to determine the number of sales personnel that should be assigned to these markets for postwar. The ratios merely show what has existed in the past and, as such, give some rational basis for each individual company's examination of its own situation.

After each company determines the number of sales personnel to be assigned to these markets—which, parenthetically, should be a part of their current postwar planning job—their attention should turn to the important objective of improving the quality and effectiveness of this sales manpower necessary to meet the conditions which, as already indicated, will be much more severe in the postwar period. To accomplish this objective the following suggestions are offered.

1. Mental Readjustment of Existing Sales Personnel

Present industrial representatives in most companies have been going through a period of negative selling. In the natural gas companies, particularly, they have been figuring out ways and means of curtailing customers' consumption, or attempting to discourage customers from changing over to natural gas. In a great many cases, customers have sought after gas service with almost as much enthusiasm as gas company representatives formerly employed in selling it to them. These circumstances may have caused many of our existing industrial and commercial sales representatives to become careless in their sales techniques. Undoubtedly, the first postwar job for any company is to re-train, re-orient, and re-enthuse their remaining industrial and commercial sales personnel.

2. Careful Selection and Training of New Recruits

As previously indicated, the personnel inventory disclosed that the average age of the existing industrial and commercial representatives has increased about three times faster than the calendar moved during the past three years. Because this has happened, emphasis should probably be placed on the selection of younger men for any new industrial and commercial sales recruits.

Sales organizations of many industries are now giving considerable thought and study to the question of properly selecting future sales personnel. I don't suggest that industrial and commercial gas sales representatives can be selected on the same basis as future furniture, vacuum cleaner, or automobile salesmen. Nevertheless, I think gas companies could go a long way toward improving the quality of their future sales

forces if they were to devote more attention to getting the right type of fresh and young personnel, with the proper sales aptitude, adequate educational and training background, to enter this field.

Once the selection of the new personnel has been made, then it will be necessary, of course, to train these men more thoroughly than ever before in the details and economics of our own business, in addition to the principles of good industrial gas sales technique. Possibly the new training techniques that have been developed during the war can be advantageously adapted to improve and speed up the gas industry's sales training job.

3. Better Functional Sales Organization

Prior to determination of the number of postwar salesmen to be recruited for these markets, groundwork should be laid in each company by examining the prewar functional organization of the industrial and commercial departments. In the past, the typical industrial gas salesman has been, as we all realize, a man of many trades. He has often been an unusual combination of combuston engineer, equipment service man, sales negotiator, rate calculator, and too many other things.

I believe that urgency of the future competitive situation, supplemented by the opportunities and necessity for maintaining and developing new revenue, will be such that gas companies must give more careful attention to sales specialization, particularly in the industrial market. It appears that those companies who are large enough to have more than three or four industrial representatives will be justified in separating their industrial personnel into a sales engineering group on one hand, and a sales contact group on the other, but having the two groups coordinated under one competent industrial sales manager. The engineering group may be further supplemented by men specializing in service work for industrial gas equipment and by special tests or furnace design men.

4. Better Company Support

In prewar days, many companies divided the responsibilities of contact and negotiation with industrial customers, among a number of departments within the organization. As a consequence, many industrial sales departments, on matters relating to company policy or installation and maintenance of company physical equipment, were unable to fully represent the company without bringing into the picture representatives of some other departments or some company official.

I believe, for effective development of the industrial market, and particularly in negotiations with large customers who pay substantial amounts of annual revenue to the company, that the prestige and importance of the typical industrial gas representative, whether he be called industrial engineer or industrial salesman, should be established and maintained in the eyes of the customer. In order to do this, the industrial representative must first be fully informed on standard company policies and practices affecting such customers, and then he should be permitted and required to act as the principal contact man with the customers. The maximum advantage of this plan of operation develops when the gas company organization as a whole recognizes, supports, and utilizes the industrial contact individual as the medium of contact on any matter affecting industrial customers. "Any matter," as here used, includes questions concerning rates, bill calculations, service installation and maintenance, credit problems, bill discount dates, etc.

I believe those companies, particularly natural gas companies, who have had reason to curtail consumption of industrial customers during the past year or so, have had ample evidence of the value of this type of industrial contacts. Generally, throughout the whole war period up to this time, the gas companies have had the best cooperation and understanding from industrial customers on such matters as new loads, curtailments, plans for the future, etc., where they had already established the proper type of contact between their industrial representative and one or more responsible officials in the industrial customers' organization. We have seen many industrial customers take prompt steps to curtail their loads when requested even some time at a loss of thousands of dollars, more to help out the

(Continued on page 280)

Dubberke to Speak

LESTER A. DUBBERKE will represent the Food Service Equipment Committee of the A. G. A. Industrial and Commercial Gas Section on the program of the Annual Meeting of the Food Service Equipment Industry which will be held at Edgewater Beach Hotel, Chicago, June 8-10. Mr. Dubberke, who is in charge of heavy duty cooking and baking sales of Milwaukee Gas Light Company, will speak on "Dealer Cooperation After the War."

The Food Service Equipment Industry Inc. is the national organization of dealers, manufacturers and distributors of equipment used in the preparation and serving of food in hotels, restaurants, clubs, institutions, etc.

Selas Has New Name

SELAS CORPORATION OF AMERICA (formerly The Selas Company), consulting and manufacturing gas engineers, Philadelphia, announces official change of its corporate name, as indicated. The action was necessitated by recent expansions and by ramifications of the company's domestic and export activities. No change in organization service, personnel or objectives is implied.

American Gas Association Industrial and Commercial Gas Advertising for June

The National Advertising Committee of the Industrial and Commercial Gas Section, J. P. Leinroth, chairman, and F. B. Jones, vice-chairman, announces that full page advertisements will appear in the trade and business magazines listed below during the month of June. These advertisements are prepared in cooperation with the Committee on National Advertising as a part of the industry's national advertising campaign.

MAGAZINE	THEME
	General Manufacturing
BUSINESS WEEK (June 17—⅔ page)	Industry is using 50% more GAS than in 1939. A striking Index to a great postwar role.
	Metals Industry
INDUSTRIAL HEATING IRON AGE (June 1) STEEL (June 26) METALS AND ALLOYS	Throw away old tables of heat penetration! New GAS techniques have speeded heat input unbelievably . . . it's a revolution in industrial heating.
	Ceramic Industry
CERAMIC INDUSTRY	GAS marches with ceramics toward greater postwar markets.
	Restaurant Field
AMERICAN RESTAURANT HOTEL MANAGEMENT	Better cooking and baking results today and tomorrow through GAS research.
	Institutional Field
INSTITUTIONS	NOW—cooking is more of a science than ever! *GAS cooking* is proving itself brilliantly despite adverse wartime conditions.
	Baking Field
BAKERS WEEKLY	Modern *GAS* baking equipment helps beat the manpower squeeze.

Wartime Distribution and Operating Problems Explored at Cleveland Conference

THE twenty-first annual Distribution Conference of the Technical Section of the American Gas Association held at Cleveland, Ohio, April 18 and 19 was a highly successful affair. More than 300 delegates took part in the meeting which lived up to its traditional high standard as a practical down-to-earth operating man's meeting.

Taking note of the fact that these conferences have "reached manhood" Ernest R. Acker, president of the American Gas Association, in his message to the delegates, paid this tribute:

"A twenty-first birthday for a man connotes his coming of age or reaching man's estate. As I think back over the years since the first gathering in Toronto, Canada, under the guidance of our genial friend, Jake Von Maur, now engineer of distribution, Consumers Gas Company of Toronto, when the first Distribution Conference was held, it would seem to me that we have a healthy and lusty infant. These conferences on the record alone obviously supply a very definite want on the part of distribution engineers whereby they may get together annually and review current practice and new developments."

President Acker also reviewed some of the major activities of the Association, stressing particularly the greatly accelerated research program and its postwar significance.

As chairman of the Distribution Committee which sponsored the conference, A. C. Cherry, The Cincinnati Gas & Electric Co., Cincinnati, Ohio, presided at the general sessions. T. H. Kendall, Equitable Gas Co., Pittsburgh, vice-chairman of the Distribution Committee, was chairman of the Luncheon Conference Committee. These luncheons, at which a large amount of useful information was forthcoming on a wide variety of distribution subjects, were held as follows:

Pipe Coatings and Corrosion—R. F. Hadley, Susquehanna Pipe Line Co., Philadelphia, chairman.

Work on Customers' Premises—J. M. Pickford, Northern Indiana Public Service Co., Hammond, Ind., chairman.

Meters and Metering—J. H. Collins, New Orleans Public Service Inc., New Orleans, chairman.

Construction and Maintenance—H. W. Nicolson, Public Service Electric and Gas Co., Newark, N. J., chairman.

A valuable innovation was the holding of a combined roundtable conference for a discussion of the vital topic "Industrial Relations." A well-informed speaker lead the discussion which was off-the-record in order to stimulate free exchange of views.

During the conference, several hundred delegates took advantage of the opportunity to inspect the testing and research facilities of the American Gas Association's Laboratories in Cleveland. Much interest was shown in their important war work. Many delegates also inspected the adjacent facilities of The East Ohio Gas Company and saw at firsthand the unique plant devoted to liquefaction, storage and regasification. Operating results of this plant to date are contained in a separate article elsewhere in this issue of the MONTHLY.

The visiting delegates were welcomed to Cleveland by J. French Robinson, president, The East Ohio Gas Co., and vice-president, American Gas Association, who highlighted the wartime technical problems of the gas man. Major Alexander Forward, managing director, A. G. A., greeted the distribution men and emphasized the importance of their work.

A. W. Olsen, Newport News, Va., and L. K. Richey, Detroit, chairman, Safe Practices Subcommittee

Following are brief summaries of the papers presented at the two-day conference:

SAFETY THROUGH PROPER DRIVING PROCEDURE—Linn Edsall,

J. P. Dresen, Public Service Co. of Colorado, Denver, and Burgess Manchester, Metropolitan Utilities District, Omaha, Neb.

W. E. Kemen, Milwaukee; J. M. Pickford, Hammond, Subcommittee on Work on Customers' Premises; L. J. Eck, chairman, Distribution Developments Subcommittee

D. P. Hartson, vice-president, Equitable Gas Company, Pittsburgh, and past chairman, Technical Section

T. H. Kendall, Pittsburgh, vice-chairman, Distribution Committee; J. French Robinson, Cleveland, A. G. A. vice-president; A. C. Cherry, Cincinnati, chairman, Distribution Committee; C. F. Turner, Cleveland, chairman, Technical Section; L. E. Knowlton, Providence, vice-chairman, Technical Section; Gladys Hanshaw, New York; Linn Edsall, Philadelphia

Philadelphia Electric Co., Philadelphia, Pa.

In this presentation of the Motor Vehicle Committee, Mr. Edsall discussed the prevention of vehicle accidents, giving reasons for more intensive efforts in the future, and considered the improvement of accident records by better equipping employees to handle the vehicles. Two methods of successful driver training were outlined: one plan makes use of group training methods; the alternate plan deals with individual drivers. Where large numbers of men must be trained quickly, the use of group or class training was said to be necessary and productive of results, but when time permits, the individual specialized instruction was recommended as preferable.

C. C. Jones, Philadelphia, chairman, Cast Iron Pipe Subcommittee; and George Mock, Washington

R. F. Hadley, Philadelphia, chairman, Pipe Coatings and Corrosion Subcommittee; and Dr. K. H. Logan, Washington

MIXED GAS RESEARCH—H. O. Loebell, Chairman, Mixed Gas Research Committee

This important paper dealt with the research work sponsored jointly by the Natural Gas Department and the Technical Section of the American Gas Association on the use of substitute gases for natural gas and for mixed natural and manufactured gas of from 800 to 1200 B.t.u. This work is an extension of that carried out several years ago on mixed gas research for gases of less than 700 B.t.u. per cu.ft. With the aid of slides Mr. Loebell presented, without conclusions, factual data developed under the committee's supervision with a brief introductory discussion of the objectives that are being sought. Mr. Loebell summarized his talk:

"The primary objective of the investigation being carried on by the American Gas Association Testing Laboratories is to determine accurately to what extent various types of substitute peak-load gases can be mixed with base natural gases without adversely affecting performance of appliances on a company's lines. It is believed that the fundamental data being obtained will permit, by mathematical means, determination of similar limits for any peak-load gas in addition to those actually investigated during this research. Since control of mixing practices is important so that gas distributed will give satisfactory services, the develop-

Donald Whitcomb, chairman, Safety Subcom.; F. A. Engel, Elizabeth; D. M. Steen, Far Rockaway; L. E. Knowlton, Providence

A. V. Brashear, Detroit; F. J. Wolfenden, Detroit; and C. L. Ruff, Detroit, all of Michigan Consolidated Gas Company

E. C. Steele, Union Gas Co. of Canada, Ltd., Chatham, Ontario; L. A. Evarts, Mineola; and G. B. McComb, New York

Gas Production and Chemical Conference

THE Joint Production and Chemical Committee Conference sponsored by the Technical Section will take place Tuesday and Wednesday, June 6 and 7 at the Hotel Pennsylvania, New York City. A strong program under the direction of V. J. Altieri, chairman, Chemical Committee, and F. J. Pfluke, chairman, Gas Production Committee, will be presented by an imposing array of speakers. A complete report of the conference will appear in the July-August issue of the MONTHLY.

ment of a suitable, simple means of informing plant operators when a limiting condition is reached is essential. The burner phase of this research should, therefore, prove to be of considerable value to the industry.

"This year's research program in this field deals only with natural gases as the base load. The plan for future work is to secure similar information for situations where 800 B.t.u. mixed gas is normally distributed. In these cases the same problems which confront the straight natural gas companies will also be encountered although probably to a somewhat lesser extent. In any event, the limiting conditions of interchangeability of 800 B.t.u. mixed gases and substitute peak-load gases will of course differ substantially from those governing when a straight natural gas constitutes the base load.

"It is considered essential that the gas industry as a whole become familiar with the increasingly critical problem of meeting winter house heating peak loads. It is felt that research now being carried on will provide a suitable background of technical information to serve as guidance in solving this problem in every natural gas and mixed natural and manufactured gas situation. This, of course, is from the standpoint of appliance performance. This activity should, it is believed, be supplemented by each company to the extent of determining availability of supply of various fuels, possibility of converting existing gas plant equipment, and a general study of the economics involved. With postwar competition approaching the severity conceived by many, it behooves the gas industry to take every step necessary to ensure, regardless of weather or send-out conditions, a continual uninterrupted supply of natural gas or standby gas of equivalent burning characteristics."

COATINGS USEFUL FOR DISTRIBUTION SYSTEMS—K. H. Logan, National Bureau of Standards

Stating that increasing shortages in manpower and materials and increasing operating costs make it essential that distribution men conserve pipe in the maintenance and extension of the system under their control, Mr. Logan considered what has been established practice regarding protective coatings and called special attention to data applicable to distribution systems. Shielded plasticized enamels and asphalt mastic coatings were nominated for consideration. The electrical testing of coatings was recommended. Mr. Logan's paper was published in full in the May issue of the MONTHLY.

POSTWAR PLANNING COOPERATION

In the absence of J. V. Postles, chairman of the Committee on Postwar Planning Cooperation, his report was read by Section Secretary A. Gordon King. Mr. Postles' committee reported progress on the topics assigned. Data have been collected on the cost of gas for house heating and the cost per therm of various gases.

DIVERSITY—THE GREAT UNKNOWN—H. B. Andersen, Chairman, Subcommittee on Economics of Distribution Design for Domestic Load Building

A review of the literature on distribution and transmission design and economics in the form of a bibliography listing 77 references was an important contribution by this recently organized subcommittee on the economics of distribution design. It was Mr. Andersen's conclusion that the literature contains ample information about the design of distribution systems for high, medium and low pressures, with regard to: (a) flow formulae and gas flow; (b) system layouts, urban and suburban, ideal square miles, and extensions to outlying territories; (c) possibility of increasing main capacities by "changeovers" and by increasing pressures; (d) allowable maximum and minimum pressures, and pressure variation.

However, it was felt that the literature does not describe what can be considered as an accepted method for determining the peak hour demand which will be imposed on a system by a given number and variety of appliances under various conditions of temperature and customer habits.

Stressing the need for information about diversity, Mr. Andersen said:

"All this means that we must get reliable information about how large and small groups of customers burn their gas appliances during the hour (or period) of our peak demand. What we need, then, is accurate, substantiated information about what we call "diversity," expressed as a percentage either of total connected load, or of total actual burner input.

"Bear in mind that, for our present purpose, we are not studying load factors, or daily, monthly, or annual sendouts. We are dealing only with the relation between the appliances which are on our lines (their total input rating) and the load which various numbers of them, in various customers' houses, throw on our mains during the 60-minutes (or 15 minutes) of peak demand.

"A definition of 'period of peak demand' is in order. The peak demand imposed by house heaters, room-type or central, is dependent on the minimum temperature which the distribution main designer intends to meet. He must decide whether he will design to meet a minimum temperature which has occurred only once in 50 years. He personally must decide whether he should provide, and how much, for a lower temperature than has ever been experienced; for an extra demand because of shortage of other fuels; or for a failure of a transmission system or of one source of supply, if there is more than one source. No committee can decide for him. Therefore, the 'period of peak demand' for a certain situation is that period—be it for 60 minutes or for

Dog-eared for Technical Men

The following list of references to technical literature deemed of interest and value to members of the Technical Section has been prepared by Luis Hilt, librarian of the American Gas Association. This is the second listing, the first having appeared in the May issue on page 228.

Petroleum

Report of American Petroleum Institute's Committee on Petroleum Reserves—A P I Quarterly, April 1944: 9-12 (ill. chart & tables); Same condensed. Chemical & Engineering News, April 25, 1944: 640-1.

Corrosion

Corrosion and Protection of Buried Metallic Structures (a series of articles compiled and abstracted by Guy Corfield. Fourth and fifth articles in the series concern "Corrosion Coupons")—Corrosion Coupons and Pipe Life Prediction—W. R. Schneider—Gas, April 1944: 39-40, 43-4; Cleaning of Corrosion Coupons—A. C. Alter & C. E. Lee—Gas, May 1944: 49-50, 54. Apparatus for Cleaning Test Coupons—H. J. Keeling—ibid. pp. 54-6.

Gas Turbine

Combustion Gas Turbine—F. K. Fischer & C. A. Meyer—National Petroleum News, May 3, 1944: R308-R313 (incl. bibliog.); Same condensed. Power, May 1944: 91-3, 156, 158.

Producer Gas—Future Fuel for Gas Turbines?—Philip W. Swain—Power, May 1944: 86-7, 164, 166.

Postwar Planning

Target for Tomorrow—Dr. E. V. Evans—Gas Journal, March 22, 1944: 369-70; Same. Gas World, March 25, 1944: 312-15, 325.

15 minutes—during which gas is used (or will be used) by customers at the maximum hourly rate, in that particular situation.

"We all need to know more about diversity during such a period as this."

THE SERVICE DEPARTMENT'S STAKE IN THE DEVELOPMENT OF POSTWAR GAS APPLIANCES—J. M. Pickford, Chairman, Subcommittee on Work on Consumer's Premises

Mr. Pickford's paper presented views on servicing problems and gas appliance design and offered concrete suggestions and examples regarding gas appliance operation so that the serviceman and his problems may be fully considered in appliance design.

POSTWAR GAS APPLIANCES FROM THE SERVICING VIEWPOINT—D. M. Steen, Queens Borough Gas and Electric Co.

The need for increased cooperation between appliance manufacturers and the service departments of gas companies was stressed by Mr. Steen. He suggested that the emphasis be placed more on performance and accessibility rather than on eye appeal. In view of its interest to Residential Gas Section members, this report is published in full under that Section of the MONTHLY.

INTERIM REPORT OF SUBCOMMITTEE ON CAST IRON PIPE STANDARDS—C. C. Jones, Chairman, The Philadelphia Gas Works Co.

Mr. Jones feels the gas industry has not been sufficiently conscious of standards and has not followed their development as much as it should. The history of cast iron pipe standards was traced back to 1892. In 1918 written specifications were published for the first time. In 1926 the American Gas Association joined with other associations in forming Sectional Committee A-21 on this work on unifying specifications for cast iron pipe of all types. Committee A-21 developed a new law of design published in 1939—a culmination of nearly 13 years of work and study. This new law has made possible specifications for cast iron pipe for gas, specifications of which are practically completed and will shortly be released. When this information is made available the gas engineer will be able to pick out the cast iron pipe and fittings best suited to his need.

SUBCOMMITTEE REPORTS

Brief reports presented by various subcommittee chairmen included "Construction and Maintenance," by H. W. Nicolson, Public Service Electric and Gas Co., Newark, N. J.; "Meters and Metering," by J. H. Collins, New Orleans Public Service, Inc., New Orleans, La.; "Pipe Coatings and Corrosion," by R. F. Hadley, Susquehanna Pipe Line Co., Philadelphia, Penna.; "Safe Practices," by L. K. Richey, Michigan Consolidated Gas Co., Detroit, Mich.; and "Safety," by Donald Whitcomb, County Gas Co., Atlantic Highlands, N. J.

Conference on the Operation of Public Utility Motor Vehicles

TUESDAY, JUNE 27, 1944

The Bellevue-Stratford, Philadelphia, Pa.

10:00 A.M.

OPENING REMARKS. E. W. Jahn, Chairman, Consolidated Gas Electric Light & Power Co. of Baltimore, Baltimore, Md.

SAFETY THROUGH PROPER DRIVING PROCEDURE. Methods of Application—Awards, Penalties, etc. Linn Edsall, Genl. Supt. of Transportation, Philadelphia Electric Co., Philadelphia, Pa.

AIR COMPRESSORS AND THEIR APPLICATION TO THE GAS INDUSTRY. Power Take-Off Drive, versus Complete Units; Interesting New Developments. C. T. Chapman, Mgr., Ingersoll-Rand Co., Philadelphia, Pa.

2:00 P.M.

THREE-DIMENSIONAL SEEING. Shop Lighting and Painting. Machine Shop Application with Special Emphasis on Auto Repairing Shop. (*Illustrated by a twenty-five minute film.*) A. A. Brainerd, Supervisor of Lighting Service, Philadelphia Electric Co., Philadelphia, Pa.

ECONOMICS OF STANDARDIZATION. Standard Body Design for Various Utility Applications; Future Developments; New Materials, etc. Sidney F. Gale, Sales Manager, American Coach and Body Co., Cleveland, Ohio.

OPEN FORUM ON SPECIFIC DESIGN FEATURES. By Members of the Committee on the Operation of Public Utility Motor Vehicles.

12:30 P.M.

GENERAL LUNCHEON. Speaker: P. T. Dashiell, Vice-President, The Philadelphia Gas Works Co., Philadelphia, Pa.

1943 Production of Coke and By-products

THE total production of gas-house coke in the United States in 1943 amounted to 862,104 net tons, valued at $6,745,791, according to the Bureau of Mines, United States Department of the Interior. Total production in 1943 decreased 30,448 tons when compared with that in 1942 and included 364,745 tons from horizontal retorts and 497,359 tons from vertical retorts, semi-inclined retorts, and miniature horizontal gas ovens. Although coke breeze is not separated from the large coke at many coal-gas plants, the amount produced at works actually separating breeze amounted to 123,192 tons, a decrease of 8,783 tons (6.7 per cent) from the 1942 total.

The quantity of bituminous coal used in the manufacture of gas-house coke decreased 85,396 tons (5.6 per cent) when compared with 1942 and totaled 1,436,216 tons. The average cost of the coal per ton delivered at coal-gas plants was $6.18 in 1943. The combined annual coal carbonizing capacity of all retorts in existence was 1,964,156 tons. Of the 3,037 retorts in existence at the end of the year, 2,491 were in operation and the rate of production for the year was 73.1 per cent of the estimated rated capacity of the industry.

Most of the gas-house coke used by producers was for fuel in heating the retorts and for the manufacture of water gas in adjacent plants. Of the 394,937 tons used by producers, 200,570 tons (50.8 per cent) were used for heating benches, 151,640 tons for the manufacture of water gas, 15,194 tons for the manufacture of producer gas, and 27,533 tons for other miscellaneous purposes, mostly for steam-raising. Ordinarily about half of the annual gas-house coke output is sold for domestic heating, but the shortage of other solid fuels during 1943 resulted in an increase in sales to domestic consumers from 50.3 per cent in 1942 to 60.2 per cent. In 1943, sales of gas-house coke were 518,825 tons for domestic heating, 26,917 tons for water-gas manufacture, and 32,189 tons for miscellaneous industrial uses compared with 449,220 tons, 21,398 tons, and 63,264 tons, respectively, in 1942.

All active coal-gas plants reported the production of crude tar in 1943. The production of 19,848,868 gallons of crude tar indicated a recovery of 13.82 gallons per ton of coal carbonized compared with 13.86 gallons in 1942. Ammonia in the form of liquor was produced at 6 plants in 1943, and the total quantity recovered in terms of NH_3 content was 1,341,896 pounds. Small quantities of crude light oil, drip oil, and holder oil were produced in 1943, but because of war-time censorship regulations no data are shown for these by-products.

Executives and Engineers Inspect Association's Laboratories

MORE than 100 delegates to the American Gas Association Distribution Conference held in Cleveland on April 18 and 19 availed themselves of the opportunity to visit the Association's Testing Laboratories. Many arrived a day early in order to inspect these research and testing facilities and gather first hand information on current activities.

Interest of visitors centered on such projects as experimental burners for utilization of 100% primary air, single point automatic ignition for oven and broiler burners, water heater service efficiency, oven heat distribution improvement, and mixed gas research. War products developed by the Laboratories likewise drew the attention of many of the guests.

President Ernest R. Acker and Managing Director Alexander Forward were among the visitors and displayed special interest in the helium purity indicator developed for war service. They are shown inspecting a model of this indicator held by W. R. Teller.

The helium purity indicator is a sensitive instrument used in connection with other war developments still of a confidential nature. It functions on the thermal conductivity principle and employs thermostatic bi-metals which react to differences in the conductivity of helium and air.

Mixed gas research is currently going forward on the basis of its application to natural gas supply problems. A principal objective is determination of limits of interchange possible by replacement gases without adversely affecting the performance of appliances in the field. Some of the precision instruments used in the study are seen in the photograph showing President Acker, Major Forward and Laboratories Director R. M. Conner. Mr. Acker holds open the cover of a Flammeter used to measure the cone height of a gas and transmit the result into numerical form while Mr. Conner is adjusting an A. G. A. precision test burner which determines burning characteristics of fuel gases such as lifting, flash back and yellow tip limits.

Association officers at the Laboratories. Left to right: Major Alexander Forward, managing director; R. M. Conner, Laboratories' director; Joan Huck; and President Ernest R. Acker

W. R. Teller (center) describing the helium purity indicator for Major Forward and President Acker

Furnace Noise Studied

THE first research bulletin to be published by the American Gas Association Testing Laboratories on Central Gas Space Heating Research has been issued as one of two new bulletins recently released to the gas industry. This project is now in progress under the supervision of the Committee on Domestic Gas Research.

Known as Research Bulletin No. 25 and entitled "A Study of Fundamentals of Resonant Noise in Gas Furnaces," the new publication presents a comprehensive analysis of the factors responsible for such noise. It also includes specific recommendations for elimination of noise in instances where it is encountered. This information is expected to be particularly useful both to designers of gas furnaces and those engaged in their servicing.

Research Bulletin No. 26, "Primary Air Injection Characteristics of Atmospheric Gas Burners," is another Laboratories publication just released. It sets forth a new empirical relationship for calculation of primary air entrainment from the dimensions of the burner, composition of the fuel gas employed and gas pressure. The treatise forms the sixth of a series of research publications which have gradually translated the technique of burner design, once largely "rule of thumb," into fundamental or empirical relationships. It reviews and correlates much of the material formerly presented in earlier publications.

These two new bulletins represent the fifteenth and sixteenth respectively of a series of research publications presenting results of a program of fundamental research for the further improvement of domestic gas appliances.

Subcommittee on Approval Requirements for Domestic Gas Ranges adopts further standards for ranges for high altitude use at April 13, 1944 meeting

Approval Standards Extended To Cover High Altitudes

INITIATING action toward adoption of approval standards for appliances operating at high altitudes, four requirements subcommittees met at the American Gas Association Testing Laboratories in Cleveland during the week of April 9. Meetings of the water heater, space heater, domestic gas range and central heating groups took place.

Proposed additions to present approval requirements for these various appliances to insure their satisfactory performance at altitudes up to 5200 feet were reviewed and adopted. These new provisions are being submitted to the entire industry for review and criticism. Their application will still further improve the service rendered by gas appliances to many customers living in high altitude areas.

Action of these groups brings to a head many years of study of performance of gas appliances at high elevations. It followed extensive tests by the Laboratories both at their Pacific Coast Branch and at Lake Arrowhead as well as at the National Bureau of Standards.

Under the requirements adopted, performance tests will be conducted under conditions simulating high altitude rather than by actual use of special high altitude chambers. While consideration was given to employing such chambers, numerous difficulties presented themselves in addition to the high initial cost. Under the proposed arrangement, equipment will be tested under sea level conditions at a specified increase above the high altitude rating desired by the manufacturer. It has been found entirely practical to duplicate performance at high altitudes by this procedure.

W. R. Teller Appointed Assistant Director

EFFECTIVE May 1, William R. Teller, chief research engineer, was appointed assistant director of the American Gas Association Testing Laboratories, according to an announcement by R. M. Conner, director. In advancing Mr. Teller, Mr. Conner credited him with being primarily responsible for the Laboratories' fine record in production of war equipment.

NATURAL GAS CONFERENCE

(Continued from page 240)

the chairmanship of Mr. Robinson, important contributions were made covering the Appalachian area by the following:

F. H. Finn, The Peoples Natural Gas Company, Pittsburgh, Pa., in collaboration with J. B. Corrin, Jr., Hope Natural Gas Company and J. J. Schmidt, The East Ohio Gas Company.

George S. Young, Columbia Engineering Corporation, New York, N. Y., and J. E. Overbeck, Columbia Engineering Corporation, Columbus, Ohio.

J. H. Isherwood, North Penn Gas Company, Port Allegany, Pa.

J. R. Reeves, Republic Light, Heat & Power Company, Inc., Buffalo, New York.

John H. Newlon, The Equitable Gas Company, Pittsburgh, Pennsylvania.

D. S. Keenan, Carnegie Natural Gas Co., Pittsburgh, Pa.

Papers on underground storage in areas other than the Appalachian area were presented as follows:

La Goleta Field, Santa Barbara County, California—M. L. Fort, Pacific Lighting Corporation.

Union Gas System, Inc.—C. W. Studt, Union Gas System, Inc., Independence, Kansas

Oklahoma—W. R. Kubista, Oklahoma Natural Gas Company, Tulsa

Ontario—Frank D. Howell, Dominion Natural Gas Company, Ltd., Brantford, Ont.; president, Canadian Gas Association

Calgary—P. D. Mellon, Canadian Western Natural Gas, Light, Heat & Power Company, Ltd., Calgary, Alberta, Canada.

Michigan—J. E. Spindle, Michigan Consolidated Gas Co., Grand Rapids, Mich.

*Keyes Storage Project—Eddy, Mexico—Van Thompson, Southern Union Gas Company.

An able summary of the above papers, together with additional information, was presented by E. G. Dahlgren, technical secretary, Research and Coordinating Committee, Interstate Oil Compact Commission.

The symposium on long distance transmission of natural gas, which took place Saturday, was held under the capable leadership of Robert W. Hendee, president, Colorado Interstate Gas Co., Colorado Springs, Colorado, and a past chairman of the Natural Gas Department. It was divided into three parts—pipe line, compressing station and dehydration plants—and consisted of prepared papers as follows:

"Pipeline Material Specifications," R. G. Strong, Natural Gas Pipeline Company of America, Chicago.

"Interior Cleaning of Natural Gas Pipe Lines," D. K. Stephens, Panhandle Eastern Pipe Line Company, Kansas City, Missouri.

"Transmission Line Experience in the Appalachian Region," J. A. Clark and C. H. McKinley, Hope Natural Gas Company, Clarksburg, West Va.

"Maintenance Features of a 22" Transmission Line," W. K. Borland, in collaboration with A. W. Sommerville and H. D. Graham, Mississippi River Fuel Corporation, St. Louis, Mo.

"Pipeline Experience in the United System," E. R. Cunningham, United Gas Pipe Line Co., Shreveport, La.

"Compressor Station Design for Long Distance Natural Gas Transmission Systems," M. C. Madsen, Northern Natural Gas Company, Omaha, Nebraska.

"Performance of Gas Compressors at High Altitudes," G. F. Brunston, Colorado Interstate Gas Company, Omaha, Nebraska.

"Recent Trends in the Dehydration of Natural Gas," Thomas S. Bacon, Lone Star Gas Company, Dallas, Texas.

"Dehydration Experience," H. J. Carson, Northern Natural Gas Company, Omaha, Nebraska.

"Dehydration of High Pressure Gas," W. F. Fulton, United Gas Pipe Line Company, Shreveport, La.

"Gas Dehydration," E. G. Hammerschmidt, Texoma Natural Gas Company, Fritch, Texas.

Lively discussion of the papers from the floor followed their formal presentation. This demonstration of interest brought to a close one of the most productive natural gas conferences held in recent years, reflecting great credit on the program committee headed by Chairman Robinson. Assisting Mr. Robinson were: A. F. Bridge, H. D. Hancock, R. H. Hargrove, E. F. Schmidt, and R. E. Wertz. Honoria B. Moomaw, secretary of the Department, was given a vote of thanks at the conclusion of the conference.

*Paper not presented. To be available in Proceedings.

Dr. Rose To Direct Coal Research

BITUMINOUS COAL RESEARCH, INC., has announced the election of Dr. H. J. Rose, of Mellon Institute, Pittsburgh, as vice-president and director of research in charge of the expanded investigational and developmental program of the bituminous coal industry.

This organization of coal operators, associations, and railroads in the Appalachian and Mid-Continent coal fields is enlarging its research projects on coal production and utilization to meet wartime problems and to prepare for and strengthen the industry's postwar position. More than two million dollars will be invested in this research program during the next five years.

Book Review

THE MINING INDUSTRIES, 1899-1939: A STUDY OF OUTPUT, EMPLOYMENT AND PRODUCTIVITY by Harold Barger and Sam H. Schurr. Published by National Bureau of Economic Research, Inc., 1819 Broadway, New York, N. Y. 452 pages, clothbound, indexed and illustrated. Price $3.00.

THIS volume offers new indexes of output, employment and output per worker in various mining industries (including oil and natural gas wells and stone quarries), and in mining as a whole. Factors influencing trends in output are reviewed—especially the growing importance of scrap metal, the improvement of coal combustion techniques and the substitution of concrete for building stone.

Since 1902, the book points out, output per manhour has risen much more rapidly in petroleum and natural gas than in any other form of extraction. Among more conventional types of mining, productivity has expanded much faster in metal than in coal mining. Such contrasts are traced to differences in rates of technological change, and to the varying importance of the role played by increasing natural difficulty. Mechanization and other matters affecting mining technology receive extended treatment; and the depletion of mineral resources is considered in relation to increased difficulties of extraction.

In a final chapter, the findings of the investigation are examined in the light of their bearing upon the outlook for mining as a segment of the nation's economy, and are related to such matters of public policy as the conservation of resources and the tariff on imported minerals.

This book is one of a number of related reports arising from studies undertaken by the National Bureau of Economic Research, an independent research organization.

INDUSTRIAL SALES PERSONNEL

(Continued from page 273

industrial representative than to help out some impersonal gas corporation as represented by some unknown representative.

5. Better Promotion and Advertising

Industrial and commercial salesmen of the postwar period will need better promotional and advertising support. It is true that we have had some national industrial advertising, sponsored by this section for many years. However, the point I wish to emphasize here is,—give your future industrial and commercial salesmen better *local* support. See that your customers get reprints of A. G. A. ads regularly and develop local promotional and advertising material. Syndicated material can be used effectively by large or small companies. From time to time take advantage of any opportunity to display the fact that the products made by a local manufacturer are made with gas.

In the commercial field particularly, postwar conditions will be such, considering the probable electric competition, that a very thorough and intensive promotional and coordinated advertising effort to support the commercial gas salesman will be necessary. Since the number of commercial customers is always larger than the number of industrial customers in any company, economical operation requires that personnel sales contact be supplemented by proper printed material to get the same coverage.

Speaking of adequate local promotion, some gas sales managements appear to be discouraged by what they consider to be the high unit cost of locally prepared direct-mail pieces, booklets, etc., to cover small industrial or commercial mailing lists. By what standard are these costs evaluated—by unjustifiable comparison with the unit costs of residential material going to large lists—or by comparison with the results obtained? Locally prepared pieces of a testimonial or case-study type have great sales force. Even one or two average sales resulting will often return much more than the entire cost of the promotion.

6. Better Sales Compensation

I put this item last, but in the minds of the men involved it should be first, no doubt. I think it goes without saying that it would be a very unwise expenditure of time and money to go through all the steps of improving and rebuilding your future industrial and commercial sales forces without being willing to pay the price to retain the proper men after you have selected and trained them.

This is one subject in the industrial and commercial inventory that I did not investigate. However, relying on general information, it is possibly the one subject that will need the most serious consideration by each individual company in the postwar period. I have already indicated that we must attract to our industry younger men of better fundamental training and education in order to compete with the industries that will be trying to take business away from us or to take prospects out of our hands. We cannot, therefore, escape the situation that we must also compete with these industries regarding comparative sales compensation and employment advantages.

It makes little difference, it appears, whether the total pay is in the form of straight salary or a combination of straight salary and commission. My past experience indicates that straight salary is possibly the most practical and equitable basis for compensating industrial men. However, in the commercial field, most companies have used a salary and commission basis for compensating commercial men. I believe the latter method of compensation for the commercial salesmen is entirely feasible and should be one of the subjects that is studied thoroughly and decided upon before attempting to recruit or rebuild your new postwar sales personnel.

Summary

The highlights of these remarks can be summarized as follows: We have not yet lost any large number of industrial representatives during the war period. The losses in the commercial classification have been quite severe, however. There was, apparently, a wide divergence of practices among both manufactured and natural gas companies as to their adequacy of sales personnel in these fields before the war. The task of rebuilding and improving the effectiveness of sales personnel includes correction of former inadequacy as well as the development of future sales forces capable of meeting intensified and aggressive competition. The financial well-being of most companies requires that the maximum profitable volume of revenue be maintained and developed from these fields.

Personnel Service

SERVICES OFFERED

Would like position as **Superintendent** carburetted water or coal gas plant, distribution department, or both. Several years' excellent practical experience in both, with good reference. Much new and replacement plant equipment experience, and control laboratory work of coke ovens. No opportunity at present location of being utilized to greatest capacity. **1482.**

POSITIONS OPEN

Engineer with gas measurement, pipe line, and some drilling experience. Give record of experiences and other pertinent information. **0390.**

Designing Engineer—Exceptional opportunity for permanent position with one of the major gas range manufacturers. Must be experienced in gas range design and product development. Must have the ability to coordinate design problems, performance requirements, with field problems and production operation. Must be graduate engineer. Give complete details as to qualifications, age, experience, education. **0391.**

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